

CLASS 335, ELECTRICITY: MAGNETICALLY OPERATED SWITCHES, MAGNETS, AND ELECTROMAGNETS

SECTION I - CLASS DEFINITION

This class is restricted to the structure of electric current switching devices or relays of general application for closing or opening electrical circuits which devices are magnetically operated or to magnet structure, per se, either electromagnets or permanent magnets, adapted for use as a source of magnetic flux for performing external work.

The devices classified in this class are for the most part of the electromagnetic type utilizing magnetic cores and armatures. However, included also are devices of the electrodynamic type wherein mutually coupled conductors are caused to move relative to each other by the interaction of the magnetic fields produced by the flow of electric currents in the conductors.

Combinations of magnetically actuated circuit makers and breakers or work magnets and electromagnets with electrical connector plugs, sockets or other special type housings or casings are in this class.

Electrical systems or circuits which include the magnetically controlled switches or relays or work magnet and electromagnet structures comprising the subject matter of this class, are excluded from this class. These systems or circuits are classified in the various electrical or art classes depending upon the type of electrical system or apparatus controlled.

This class also includes subcombinations of magnetically actuated switches and relays classified in this class and which are either claimed as used in a magnetically actuated switch or relay or which are by disclosure peculiar to such use.

SECTION II - REFERENCES TO OTHER CLASSES

SEE OR SEARCH CLASS:

29, Metal Working, subclasses 602.1+ for methods of manufacturing transformers and inductances, and residual methods of manufacturing magnets and electromagnets which do not fall elsewhere, and see the extensive notes to subclass 602.1 for the lines between Class 29 and other classes.

140, Wireworking, subclasses 71+ for wireworking apparatus, some of which can be used to manufacture electromagnets.

148, Metal Treatment, subclasses 100 through 122 for processes of improving the magnetic properties of material having at least one component which is a free metal or alloy, other than by mere magnetization, and subclasses 31.55 and 31.57 for stock resulting from such processes; subclass 100, notes, for lines between Class 148 and other classes.

174, Electricity: Conductors and Insulators, for miscellaneous conductors and insulator structure, some of which is applicable in the electromagnet.

178, Telegraphy, appropriate subclasses for magnets and electromagnets utilized in telegraph communication systems.

198, Conveyors: Power-Driven, subclass 381, 439 and 619 for magnetic type conveyors.

204, Chemistry: Electrical and Wave Energy, subclasses 155+ for processes for producing chemical changes by the use of magnetic devices and subclass 193 for corresponding apparatus.

210, Liquid Purification or Separation, subclasses 222+ for such subject matter having magnetic means to effect the purification or separation.

219, Electric Heating, subclasses 600+ for inductive heating, subclasses 678+ for microwave heating, and subclasses 764+ for capacitive dielectric heating.

221, Article Dispensing, appropriate subclasses and see especially subclass 212 for magnetic article holding discharge assistants and the controls therefor.

234, Selective Cutting (e.g., Punching), appropriate subclasses, and particularly subclasses 59+ for a pattern-controlled selective cutting machine wherein the pattern sensor may involve electrical circuit-controllers.

242, Winding, Tensioning, or Guiding, subclasses 430+ for winding of motor cores, inductances, and resistances.

246, Railway Switches and Signals, appropriate subclasses for electric railway signaling systems utilizing magnets and electromagnets.

250, Radiant Energy, subclasses 281+ for ionic separation or analysis methods and apparatus which use magnets or electromagnets, subclasses 396+ for electron or ion beam deflection or focusing systems utilizing magnets or electromagnets.

- 252, Compositions, subclasses 62.51+ for processes of making magnetic compositions and the resulting product when it is claimed as stock or bulk material, and subclasses 500+ for electrically conductive compositions and devices defined solely in terms of the composition of which they are composed. Included are contacts and switches defined solely in terms of their composition or stock.
- 292, Closure Fasteners, subclass 251.5 for magnetic closure fasteners.
- 294, Handling: Hand and Hoist-Line Implements, subclass 65.5 and 88 for magnetic lifting and grappling devices.
- 307, Electrical Transmission or Interconnection Systems, particularly subclass 38, 55+, 96+, 100, 326+ for switching systems and subclass 101 for the control or removal of residual or remnant magnetism.
- 310, Electrical Generator or Motor Structure, subclasses 10+ for electric motor and generator structure utilizing magnets or electromagnets.
- 313, Electric Lamp and Discharge Devices, is the generic class for the structure of space discharge devices; subclasses 153+ for space discharge devices and lamps utilizing magnets or electromagnets; subclasses 146+ for Class 313 for discharge devices which are provided with a movable electrode. Some discharge devices are closely analogous in structure to some types of circuit makers and breakers. See Class 313, class definition, Lines With Other Classes and Within This Class, "Distinction Between Discharge Devices and Electric Switches," for the distinction between a space discharge device and a circuit maker and breaker.
- 314, Electric Lamp and Discharge Devices: Consumable Electrodes, appropriate subclasses for arc lamps having magnets and electromagnets for controlling the feed of arc electrodes. Note particularly subclasses 113+.
- 315, Electric Lamp and Discharge Devices: Systems, appropriate subclasses for electric lamp and space discharge device systems having electromagnets and magnets.
- 318, Electricity: Motive Power Systems, appropriate subclasses for electric motor control systems utilizing magnets, electromagnets or relays, particularly subclasses 789+ for induction motor systems operating from a single phase source with start winding removal under the control of an electromagnetic switch; and subclasses 821+ for induction motor systems having the impedance of the secondary circuit under the control of an electromagnetic switch.
- 320, Electricity: Battery or Capacitor Charging or Discharging, appropriate subclasses for battery and condenser charging and discharging systems utilizing magnets and electromagnets or relays.
- 322, Electricity: Single Generator Systems, appropriate subclasses for generator systems utilizing magnets, electromagnets or relays.
- 323, Electricity: Power Supply or Regulation Systems, appropriate subclasses for voltage control or phase control systems utilizing magnets, electromagnets or relays.
- 324, Electricity: Measuring and Testing, subclasses 415+ for contact, relays and switch testing, subclass 200 for magnetic testing devices utilizing magnets and electromagnets or inductors, and subclasses 76.11+ for electric meters utilizing magnets and electromagnets.
- 332, Modulators, appropriate subclasses for modulators utilizing magnets and electromagnets.
- 333, Wave Transmission Lines and Networks, appropriate subclass for wave transmission lines and networks utilizing magnets, electromagnets or relays, subclasses 101+ for plural channel systems including branched circuits with switching, subclass 13 for resonator type breakdown discharge system, e.g., T-R or R-T systems, and 245+ subclasses for long line elements and components which may perform a switching or blocking function, e.g., long line short circuiting switches and long line shorting plugs.
- 334, Tuners, appropriate subclasses for a variable tuner comprising an inductor and a capacitor, with the inductor and/or capacitor being variable, subclasses 47+ for tuners which are varied or adjusted by a switching operation which usually involves a make and break type switch of the electromagnetically actuated type.
- 336, Inductor Devices, appropriate subclasses for the structure of transformers and inductive reactors of general utility.
- 340, Communications: Electrical, appropriate subclasses for miscellaneous electrical communication systems utilizing magnets, electromagnets or electromagnetically actuated switches.
- 343, Communications: Radio Wave Antennas, for radio wave energy systems such as radar and directive systems, which have an antenna, some of which systems utilize magnets, electromagnets or relays and for antennas which

- may utilize electromagnetically actuated switches, note particularly subclass 768 for slot type antennas with periodic control of the slot or coupling; subclass 777 for plural wave guide type antennas with control of the individual antenna; subclass 876 for antennas with switching between the antennas and lines; and subclass 904 for antennas which may be combined with a switch.
- 346, Recorders, appropriate subclasses for recording devices utilizing magnets, electromagnets or relays.
- 361, Electricity: Electrical Systems and Devices, subclasses 245+ for polarity reversing systems; subclasses 2+ for safety systems involving circuit interruption; subclasses 139+ for relay and electromagnetic switching systems; and subclasses 600+, especially subclass 376 for arrangements of circuit-closer structures on a mounting or combinations of circuit-closers with conductors or busbars, including enclosed or housed switchboards.
- 362, Illumination, subclass 398 for electric illumination device having magnetic supporting means.
- 363, Electric Power Conversion Systems, appropriate subclasses for conversion systems utilizing electromagnets, magnets, or relays.
- 373, Industrial Electric Heating Furnaces, particularly subclasses 138+ for heating inductors combined with electric furnace structure.
- 422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 186.01+ for apparatus for producing chemical changes in electromagnetic fields.
- 427, Coating Processes, subclasses 58+ for coating processes, per se, wherein the product in useful as an electrical product.
- 428, Stock Material or Miscellaneous Articles, subclasses 375+ for coated electrical conductors which may include contacts and switches, but which are merely recited as a base with a particular coating thereon.
- 439, Electrical Connectors, subclass 12 for electrical connectors having magnetic holding means.
- 455, Telecommunications, subclasses 352+ for remotely controlled radio receivers which may use electromagnets; and subclasses 170.1+ for radio receivers for tuning or wave selection using electromagnets.
- 505, Superconductor Technology: Apparatus, Material, Process, subclasses 150+ for high temperature ($T_c > 30\text{ K}$) superconducting devices, and particularly subclasses 211+ for

- electrical energy storage devices, magnetic coils, wires, cable, etc.
- 600, Surgery, subclasses 9+ for permanent magnets or electromagnets utilized in surgery and diagnostics.

SUBCLASSES

- 1 This subclass is indented under the class definition. Devices including at least one contact actuating switch means of the type classifiable in this class in combination with a diverse type switching means of a type classifiable elsewhere in another art class. The two or more switching means may be physically located in the same housing or casing and may have cooperative features as long as each one is operative independently of the other. Some examples of diverse type switches are the mechanical, thermal and thermal current actuated type.

- (1) Note. In order to be classifiable in this subclass the claimed subject matter must include means whereby at least one set of main contacts are opened or closed entirely under the influence of magnetic means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 141+, for single switch devices having a principal actuating means which is magnetically controlled in combination with thermal current responsive means.
- 159+, for patents claiming a plurality of independent switch devices under the class definition.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclass 5 for devices, other than magnetically actuating, comprising a plurality of switches, each being separately operated whereby a plurality of contacts are actuating to control at least two or more circuits; subclasses 175+ for nonmagnetically controlled telephone type switches, not restricted to the telephone art by claimed subject matter, wherein a plu-

- ality of contacts are automatically selected; subclass 50 for a plurality of nonmagnetically operated switches adapted to be operated in a predetermined sequence; subclass 51.04 for plural switches selectively controlling multiple circuits and combined with or actuated by connector coupling; subclass 81.4 for devices comprising a plurality of fluid pressure actuated switches.
- 307, Electrical Transmission or Interconnection Systems, particularly subclass 29, 38, 113+, and 326+ for switching systems which may include plural switches.
- 337, Electricity: Electrothermally or Thermally Actuated Switches, subclasses 2+ for electrothermal or thermally actuated circuit makers and breakers.
- 361, Electricity: Electrical Systems and Devices, subclasses 139+ for electric circuits for relays and electromagnets which may include a plurality of switches.
- 2** This subclass is indented under the class definition. Devices including operating or actuating means for opening or closing the switch contacts and in which at least one of such operating or actuating means is an electromagnet. For purposes of classification in this subclass an electrical circuit is considered to be the equivalent to a single continuous conductor joining a source to a load through a device capable of interrupting or completing the continuity of the conductor.
- (1) Note. The subject matter to be found in this and the indented subclasses includes devices known as “electromagnetic switches”, “circuit breakers”, “relays” and “electromagnetic interrupters”.
- (2) Note. Devices commonly known as “relays” and which, by enclosure, contain all the essential structure to make a switch, but in which the claimed subject matter does not include actual contact structure are in this class in subclasses 209+ below.
- (3) Note. For electromagnetically actuated switches forming an element of an electrical control circuit for a particular art device search should be extended to the art class relating to the particular art device to be controlled.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 209+, below, for subject matter relating to electromagnet with armature and for electromagnet or magnet structure, per se.
- SEE OR SEARCH CLASS:
- 178, Telegraphy, appropriate subclasses for electromagnetically operated switching devices and keying devices or other code transmitters especially adapted for the telegraph art.
- 200, Electricity: Circuit Makers and Breakers, subclass 12 for pivoted contact dial type switches with electromagnetic release, subclasses 402+ for double snap switches utilizing magnetic means to improve the snap action, subclass 83 for diaphragm type, fluid pressure actuated switches with a magnet.
- 218, High-Voltage Switches With Arc Preventing and Extinguishing Devices, subclasses 22+ for electromagnetic or permanent magnetic blow out means for extinguishing an arc.
- 246, Railway Switches and Signals, appropriate subclasses, especially subclasses 218+ for electrically actuated electromagnetic switch and signal devices peculiar to the railway art.
- 307, Electrical Transmission or Interconnection Systems, subclasses 112+ for switching systems in which the individual switches may be wholly or in part electromagnetically controlled.
- 310, Electrical Generator or Motor Structure, subclasses 10+ for dynamo-electric machine structure, particularly subclasses 31+ for reciprocating devices with self-actuated interrupter, and subclasses 40+ for rotary machines, which may include switching devices in the form of commutators.
- 318, Electricity: Motive Power Systems, appropriate subclasses for motor control systems which may include elec-

- 324, Electromagnetic control switch means, see especially subclasses 445+.
- 324, Electricity: Measuring and Testing, subclasses 415+ for contact, relay and switch testing.
- 340, Communications: Electrical, appropriate subclasses for electromagnetic switches utilized in electrical signaling or communication systems in general.
- 361, Electricity: Electrical Systems and Devices, subclasses 1+ for electromagnetic switches used in safety and protection systems, subclasses 139+ for control circuits for electromagnetic devices, and subclasses 247+ for igniting system using magnets or electromagnetic control means.
- 3** This subclass is indented under subclass 2. Devices including at least one element of the contact actuating or control means which consists of ferromagnetic material whose physical dimensions are subject to change in the presence of a magnetic field.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
215+, for magnetostrictive device actuator structure, per se.
- SEE OR SEARCH CLASS:
310, Electrical Generator or Motor Structure, especially subclass 26 for the structure of magnetostrictive type, reciprocating, dynamoelectric machines.
318, Electricity: Motive Power Systems, especially subclass 118 for magnetostrictive motor with control system therefor.
361, Electricity: Electrical Systems and Devices, subclasses 139+ for control circuits for electromagnetic devices.
- 4** This subclass is indented under subclass 2. Subject matter in which the device includes structure which peculiarly adapts or restricts its use to radio-frequency or microwave frequency conductive circuitry.
- (1) Note. The switching devices found in this and indented subclass 5 below comprise contact means whereby a continuous physical path is established in one or more conductors of the circuit to be controlled.
- SEE OR SEARCH CLASS:
333, Wave Transmission Lines and Networks, for high frequency wave transmission line and network switching systems, particularly subclasses 2+ for automatically controlled plural channel systems, subclasses 101+ for branched circuit switching, subclass 13 for resonator breakdown systems (e.g., TR or RT systems), subclass 15 for pilot line controlled systems; subclass 16 for pilot current controlled systems, subclasses 17.1+ for automatically controlled systems and subclasses 245+ for wave transmission components that may include switches.
343, Communications: Radio Wave Antennas, subclass 777 for plural wave guide antennas with lobe switching and subclasses 876 and 904 for antennas with switch.
455, Telecommunications, subclasses 78+ for so-called T. R. switches connecting first the transmitter and then the receiver selectively to an antenna.
- 5** This subclass is indented under subclass 4. Subject matter wherein the device includes structure which peculiarly adapts it for use in the completion or disconnection of circuitry consisting of coaxial conductors.
- SEE OR SEARCH CLASS:
200, Electricity: Circuit Makers and Breakers, subclasses 1+, for multiple circuit control devices in which a plurality of contacts; which are not electromagnetically actuated, are arranged to switch two or more circuits.
- 6** This subclass is indented under subclass 2. Subject matter wherein the device comprises means whereby normally closed contacts are automatically interrupted upon the occurrence of an abnormal circuit condition in a circuit with which the device is designed to be used. The circuit interrupting device may be, by way of example, of any one of the types known as "air circuit breakers" or "oil circuit breakers",

which circuit breakers may be of the “single-throw”, “double-throw” or “multiple circuit breaker” type; provided, that at least one electromagnet is utilized as a means for operating the contacts to an open position upon the occurrence of an abnormal condition.

SEE OR SEARCH CLASS:

- 218, High-Voltage Switches With Arc Preventing and Extinguishing Devices, subclasses 1+ and 22+, for circuit interrupting devices with nonmagnetic control means combined with magnetic blow out.
- 307, Electrical Transmission or Interconnection Systems, particularly subclass 39, 86, 97, 116+, and 328 for condition responsive switching systems.
- 320, Electricity: Battery or Capacitor Charging or Discharging, appropriate subclass for a circuit making or breaking device responsive to a predetermined condition in a battery charging or discharging circuit or a battery itself.
- 337, Electricity: Electrothermally or Thermally Actuated Switches, appropriate subclasses for similar devices electrothermally or thermally controlled.
- 361, Electricity: Electrical Systems and Devices, subclasses 1+ for devices similar to those to be found in Class 335 utilized in circuit safety or protective systems, particularly subclasses 91.1+ and 93.1+ which includes specific circuit breaker or relay structure.

- 7 This subclass is indented under subclass 6. Subject matter wherein the automatic circuit interrupting device comprises means responsive to plural diverse abnormal circuit conditions such as overload under voltage, etc. Usually the actuating means comprises separate devices each of which responds to a given predetermined condition and is operative either independently or in cooperation with another means. Some examples; (1) plural electromagnets one of which is voltage responsive and one of which is current responsive or (2) overload and underload coils.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 35+, for significant trip structure of a combined nature such as magnetic and thermal, for instance.

SEE OR SEARCH CLASS:

- 307, Electrical Transmission or Interconnection Systems, subclass 116 for condition responsive switching systems which may or may not be responsive to a plurality of conditions.
- 361, Electricity: Electrical Systems and Devices, subclasses 1+ and appropriate subclasses, for safety and protection systems and devices which may be responsive to a plurality of conditions in the systems.

- 8 This subclass is indented under subclass 6. Subject matter wherein the circuit interrupting device comprises a plurality of individual conductors with contact pairs associated with each conductor a contact pair actuating means for each contact pair, each contact pair completing a circuit through one conductor of a polyphase or plural conductor transmission line. Devices which are known as bipole or double pole and which complete the circuit in each conductor of a direct current circuit will also be found here.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 102, for polyphase switches designed to be actuated by alternating or fluctuating current and having a plurality of contacts whereby one polyphase input is connected to a similar polyphase output.
- 106, for devices of the multiple contact type wherein a plurality of external circuits may be completed or opened either selectively or simultaneously by a magnetically actuated switch means.

SEE OR SEARCH CLASS:

- 307, Electrical Transmission or Interconnection Systems, subclasses 13+ for polyphase systems in general which may include phase switches and subclasses 112+ for plural phase switch-

- ing systems, especially subclass 127 for phase sequence responsive type.
- 361, Electricity: Electrical Systems and Devices, subclasses 1+ for similar switching or circuit interrupting devices combined with safety and protective systems, particularly subclass 76 for such systems with phase sequence analyzer means.
- 9 This subclass is indented under subclass 8. Subject matter wherein the device comprises individual latching or tripping means associated with each separate phase or leg contact pair thereof. The individual latch or trip means may operate individually on its corresponding contact pair of the circuit, or, may upon operation, actuate a tripping bar whereby the remaining contact pairs are opened.
- 10 This subclass is indented under subclass 8. Subject matter wherein the interrupting device comprises a single latch or trip means whereby the plurality of phase or leg contacts pairs are simultaneously maintained in a first position until released whereupon the plurality of contact pairs are allowed to open simultaneously.
- 11 This subclass is indented under subclass 6. Subject matter wherein the automatic circuit interrupting means consists of two or more separate and distinct devices adapted to jointly or separately interrupt the continuity of a circuit to be controlled. The devices may be connected in series, tandem or any other desired arrangement provided there is single continuous circuit from a source to a load through the switch means. For example, each switch may be in one leg of a two conductor circuit.
- (1) Note. The devices to found here differ from the multiple or polyphase devices in subclasses 8+ above, in that the subject matter relates to devices for interrupting a single polyphase circuit by a single switch means having at least one pair of contacts for each phase.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 8+, for multiple or polyphase switches.
 See (1) Note above.
 88+, for plural periodic switches.
- 152, for plural vacuum or hermetically sealed switches.
- 159+, for plural electromagnetically actuated switches not specifically recited as automatic circuit interrupter devices and each being operative independently of the other.
- 206, for plural permanent magnet actuated switches.
- SEE OR SEARCH CLASS:
 200, Electricity: Circuit Makers and Breakers, subclass 5 for multiple circuit control devices constituting a plurality of switches.
- 307, Electrical Transmission or Interconnection Systems, subclasses 113+ for switching systems comprising plural switches.
- 361, Electricity: Electrical Systems and Devices, subclasses 1+ for safety and protection systems and devices which may include a plurality of interrupter devices and subclasses 139+ for electric circuits for relays and electromagnets particularly subclasses 160+ for plural relays and electromagnets.
- 12 This subclass is indented under subclass 6. Subject matter wherein the interrupting device structure includes auxiliary contacts or other significant means whereby an electrical shunt circuit is established to bypass either the main circuit contacts or the operating coil of the device, prior to the opening or closing of the main contacts, thereby preventing arcing and damage to either the main contacts or the operating coil.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 156, for electromagnetically actuated switches combined with protective means.
 201, for magnetic switches with arc prevention means.
 236+, for electromagnetic relays with a shunt path for the magnetic flux.

SEE OR SEARCH CLASS:

- 218, High-Voltage Switches With Arc Preventing and Extinguishing Devices, subclasses 1+ for nonmagnetically controlled switches with arc prevention means.
- 307, Electrical Transmission or Interconnection Systems, subclasses 134+, for switching systems with arc prevention or other switch contact operation facilitating means.
- 337, Electricity: Electrothermally or Thermally Actuated Switches, subclasses 15+ for electrothermally actuated shunt circuit completion devices.
- 361, Electricity: Electrical Systems and Devices, subclasses 1+ for protective devices with arc prevention, subclasses 54+ and 58 for electromagnetic device protection circuits with shunting or impedance insertion means.

- 13** This subclass is indented under subclass 6. Subject matter wherein the interrupting device structure includes at least one auxiliary switch means operative independently of the main circuit contacts whereby a circuit is completed through the electromagnetic operating coil of the contact actuating means or through some other operative element of the device such as a holding or tripping coil.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 12, for similar structure wherein the auxiliary switch comprises shunting contacts.
- 157, for electromagnetically actuated switches with holding magnets which may be actuated by a circuit extending through holding contacts.

- 14** This subclass is indented under subclass 6. Devices wherein the circuit interrupting means is directly connected to the movable contact or contacts and operable by the effect of a magnetic field through a movable armature, or other mechanical means responsive to the magnetic field of a flux source. That is the devices found in this subclass do not utilize a motion converting mechanism between the movable armature or core and the contacts. The devices

classified here are, for the most part, of the class or apparatus generally shown as "cut outs".

- (1) Note. To complete the search the various classes listed in the search notes under Class 317, subclass 9 should be consulted.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 68+, for devices in which the contacts are motor operated.
- 78+, for polarity responsive devices where at least one of the contacts may be directly carried by the armature.
- 87+, for periodic switches where at least one movable contact is carried by a flexible armature.
- 147+, for electrodynamically operated switches which cause the contacts to open directly.
- 203, for armature structure significant to switches, in which the armature may comprise a contact bridging means.

SEE OR SEARCH CLASS:

- 361, Electricity: Electrical Systems and Devices, subclasses 1+ for safety and protection systems which may in general include cutouts.

- 15** This subclass is indented under subclass 6. Subject matter wherein the interrupting device comprises significant structure whereby the movable contact or contacts are biased either open or closed, the pressure between the contacts is controlled or regulated or by which the contacts are held in the operative condition and which structure is separate and distinct from the conventional latching devices customarily in use.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 157+, for switching devices, not restricted to the automatic circuit opening function, having significant locking or holding structure.
- 188, for snap action contact actuating means.
- 192, for contact carrying on actuating structure with biasing means.

- 193, for contact actuators with vibration, bounce or chatter prevention means.
 194+, for contact pressure maintaining or adjustment means.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Maker and Breakers, appropriate subclasses for similar contact biasing or holding means for nonmagnetically actuated switches, especially subclass 170 for contact pressure adjustment switches.
 307, Electrical Transmission or Interconnection Systems, subclass 142 for miscellaneous switches having locking, holding or breaking means for the switch.
 361, Electricity: Electrical Systems and Devices, subclasses 170+ for relay systems having relays with contact pressure increasing means, and subclass 194 for relay systems having relays with holding means such as a locking contact.

- 16** This subclass is indented under subclass 15. Subject matter wherein the significant biasing, holding or pressure control means consists of either a magnet or other device which depends for its operation on the reaction between current in one part of an electric circuit and the current in another part, such as a current loop for creating electrodynamic forces tending to separate or close the relatively movable contacts.

- 17** This subclass is indented under subclass 6. Subject matter wherein the circuit interrupting device includes signalling, indicating or alarm structure whereby the condition of the switch, whether open or closed, physically inoperative, etc., is automatically communicated to an operator or other interested observer by visual or audible means. In order to be classifiable in this subclass the signalling or indicating means must include structure in addition to an operating lever or other operating means whose position is dependent upon whether the contacts are open or closed.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 156, for electromagnetically operated switches with significant protective

means for the switch itself or its contacts.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclass 167 for switches in general with indicators.
 337, Electricity: Electrothermally or Thermally Actuated Switches, appropriate subclasses for various types of electrothermal and thermally actuated switches with indicators.
 340, Communications: Electrical, subclasses 480+ for electromagnetically operated mechanical traffic or vehicle signals, subclass 523 for signalling devices responsive to the sequence of operation of plural circuit breakers, subclass 644 for a switch or relay condition signalling device without significant switch or relay structure, and subclasses 652 and 366+ for visual signals electromagnetically actuated.

- 18** This subclass is indented under subclass 6. Subject matter wherein the structure includes means automatically responsive specifically to predetermined current values in the circuit to be controlled or to some abnormal current condition in the circuit, such as current reversal, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 155, for switching devices, which are not specifically claimed as automatic circuit interrupting devices, and having operative means responsive to predetermined current or voltage value.

SEE OR SEARCH CLASS:

- 307, Electrical Transmission or Interconnection Systems, appropriate subclasses, particularly subclasses 125+ for miscellaneous switching systems responsive to electrical conditions.
 318, Electricity: Motive Power Systems, appropriate subclasses for motor control switches which may be responsive to predetermined condition or abnormal current or voltage value in a motor circuit.

- 337, Electricity: Electrothermally or Thermally Actuated Switches, appropriate subclasses for electrothermal and thermally actuated switches, which may be set to operate at a predetermined current value.
- 340, Communications: Electrical, subclasses 635+ for signals and alarms responsive to a predetermined condition of electrical apparatus.
- 361, Electricity: Electrical Systems and Devices, subclasses 91.1+ and 93.1+ for safety and protection systems and devices responsive to predetermined condition such as voltage or reverse current.
- 19** This subclass is indented under subclass 18. Subject matter wherein the automatically responsive means is designed to be actuated when the current in the circuit to be controlled falls to a zero value.
- 20** This subclass is indented under subclass 6. Subject matter wherein the structure includes means automatically responsive specifically to predetermined values, or some abnormal condition, of the voltage existing in the circuit to be controlled, such as, for example, over-voltage under-voltage or no voltage.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 155, for electromagnetic switches, not specifically claimed as automatic circuit interrupters, having means responsive to a predetermined voltage value.
- SEE OR SEARCH CLASS:
- 307, Electrical Transmission or Interconnection Systems, appropriate subclasses, particularly subclass 130 for switching systems which are voltage responsive.
- 361, Electricity: Electrical Systems and Devices, subclasses 88+ for voltage responsive safety or protection systems, and subclasses 139+ for relay systems which may be responsive to predetermined voltage levels.
- 21** This subclass is indented under subclass 6. Subject matter wherein the structure includes significant details of operating means whereby
- the contacts may be restrained in a closed condition by a latch or detent which may be tripped by the action of a magnet or other means. The contacts are usually held in circuit closing position and tripped to open position.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 167+, for significant latch devices.
- 172+, for tripping devices peculiarly adapted for use with electromagnetic switches but not restricted to automatic interrupters.
- 253+, for electromagnet and armature in general with armature latch.
- SEE OR SEARCH CLASS:
- 74, Machine Element or Mechanism, for automatically controlled mechanisms.
- 200, Electricity: Circuit Makers and Breakers, subclasses 12+ for dial type switches with electromagnetic release, subclasses 39+ for clock train operated switch with retarded latch trip, subclasses 411+, 415+, 470, 471, and 424 for snap switches with latch trip.
- 337, Electricity: Electrothermally or Thermally Actuated Switches, subclasses 70+ for bimetallically controlled electrothermal switches with thermally controlled latch or trip means, 150+ for fusible element controlled switches with latch or trip means, 174 for fusible cut out devices with latch or trip means and 356 for thermally controlled switches with latch or trip means.
- 22** This subclass is indented under subclass 21. Subject matter wherein the significant latching or tripping structure comprises two or more separate means, whereby the contacts are maintained in a closed position until released or whereby the latching means is released and the contacts allowed to open, and each acting independently of the other. Devices in which the latching means comprises a main latch under the control of an auxiliary latch and in which the actuation of the main latch depends upon the condition of the auxiliary latch will not be found here but in the generic subclass 21 above.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 169, for details of plural or combined latch means adapted for use with electromagnetic switches.
- 173, for details of plural tripping means adapted for use with electromagnetic switches.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclasses 39+ for nonmagnetically activated retarded switches with latch trip means, subclasses 70+ for double snap switches with latch trip, subclass 470, 471 for single snap with latch trip, subclass 78 for reciprocating contact snap switches with latch trip, and subclass 169 for latch structure.
- 337, Electricity: Electrothermally or Thermally Actuated Switches, subclass 71 and 175 for electrothermally actuated switches with combined latching or tripping means.

23 This subclass is indented under subclass 22. Subject matter wherein the latching or tripping means consists of a plurality of means, each of which is operable upon a different principle, as for instance, one may be magnetic and the other mechanical, or one thermal and the other manual.

24 This subclass is indented under subclass 21. Subject matter wherein the device comprises, other than in name only, significant details of structure which is operative, upon the occurrence of abnormal condition in the controlled circuit, to prevent the main contacts from remaining closed or the latch from functioning regardless of the operation of a closing means, or wherein the main contacts are automatically opened upon the occurrence of an abnormal circuit condition independently of the position of a manual or other contact closing means. One example of a device to be found here consists of a manually closed switch in which a mechanical latch is operated by a handle to maintain the contacts in closed condition, the latch being operated or tripped automatically by some overload condition even though the closing lever remains in the actuated condition.

- (1) Note. Where the claim recites that the device is "trip-free", without any specific details of such a feature and then recites specific details of structure which would cause the patent to be placed in a more restricted subclass below, the original patent will be placed in the more restricted subclass and officially cross-referenced back in this subclass.

SEE OR SEARCH CLASS:

- 361, Electricity: Electrical Systems and Devices, subclasses 1+ for safety and protection systems may employ circuit interrupters which are nonreclosable.

25 This subclass is indented under subclass 24. Subject matter wherein the device includes significant structure whereby the operative connection between the main contact actuating means and the means for maintaining the contacts in a closed condition (latch) is disabled. The disabling means may include manual, gravity actuated, lost motion or magnetic devices.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 157+, for switches with lock open structure for preventing the contacts from being actuated.

26 This subclass is indented under subclass 21. Subject matter wherein the structure includes significant means whereby after an automatic disconnection of the main contacts, upon the occurrence of a fault or surge in the circuit, the contacts are automatically reclosed to restore service in the event that the fault has been removed; or means whereby the latching mechanism is reset to an operative condition whereby the contact actuating means will be rigidly held in an operated condition upon the contacts being reclosed.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 166, for electromagnetically actuated switches in general with latch or trip resetting means.

SEE OR SEARCH CLASS:

361, Electricity: Electrical Systems and Devices, subclasses 71+ for safety and protective systems with means for subsequent automatic restoration of the system to a normal operative condition.

- 27** This subclass is indented under subclass 26. Subject matter wherein the structure includes significant means whereby the tripping operation is accomplished automatically and the reclosing or resetting operation is accomplished by manual means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

164, for manual or gravity actuated latch with electromagnetic trip.

SEE OR SEARCH CLASS:

361, Electricity: Electrical Systems and Devices, subclass 93.4 for abnormal current condition protection including automatic circuit reset after interruption of electric system, and subclass 114 for protective systems including means for manual and automatic opening of a breaker with manual reclosing means.

- 28** This subclass is indented under subclass 26. Subject matter wherein the reclosing or resetting structure is automatically operated and is combined with significant means whereby one or both operations take place after a time interval longer than the normal operating interval or after a fixed or predetermined interval which may be shorter than the normal interval.

SEE OR SEARCH THIS CLASS, SUBCLASS:

39+, for magnetic latch or trip means with time delay means.
 59+, for electromagnetically actuated switches of the retarded or delayed type.
 139, for step-by-step switches with timing or index means.
 218, for temperature responsive magnets and electromagnets with time delay means.

239+, for electromagnet with armature time delay movement control means.

SEE OR SEARCH CLASS:

200, Electricity: Circuit Makers and Breakers, subclasses 33+ for nonmagnetically actuated switches of the retarded type.
 307, Electrical Transmission or Interconnection Systems, subclasses 14+ for switching systems with time delay or retardation means.
 318, Electricity: Motive Power Systems, and subclasses 445+ for automatic stopping and/or starting means with time delay.
 361, Electricity: Electrical Systems and Devices, subclass 91.3 for overvoltage protection with time delay means and subclasses 195+ for relay systems with time delay features.
 388, Electricity: Motor Control Systems, art collection 921 for motor control systems including time delay means.

- 29** This subclass is indented under subclass 28. Subject matter wherein the significant timing or delay means is fluid controlled.

SEE OR SEARCH THIS CLASS, SUBCLASS:

61, for electromagnetically operated switches in general with pneumatic delay means.
 62, for electromagnetically operated switches in general with hydraulic delay means.
 240, for electromagnet with an armature movement control by the dashpot.

SEE OR SEARCH CLASS:

188, Brakes, subclasses 266+, for a fluid-resistance brake or shock absorber of general utility.
 200, Electricity: Circuit Makers and Breakers, subclass 34 for nonmagnetically actuated switches with dashpot retarding means and subclasses 81+ for fluid pressure actuated switches.
 361, Electricity: Electrical Systems and Devices, subclass 116 for systems utilizing pneumatically operated breakers.

- 30** This subclass is indented under subclass 28. Subject matter wherein the delay structure includes means whereby the time interval between the opening of the contacts and the reclosing thereof, the resetting of the latch, or the permanent opening (lockout) of the main contacts is controlled by a mechanical motor means.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 64+, for electromagnetically actuated switches of the retarded or delayed type utilizing a motor or motor controlled means.
- 139, for step-by-step switch clock mechanism timing means.
- 239+, for electromagnets with time delay armature movement control means.

SEE OR SEARCH CLASS:

- 178, Telegraphy, subclass 76 for retarded circuit closers peculiar to telegraph circuits.
- 200, Electricity: Circuit Makers and Breakers, subclasses 35+ for nonelectromagnetically operated switches of the retarded type and utilizing clocks, clock trains or similar gearing as a retarding means.
- 307, Electrical Transmission or Interconnection Systems, subclasses 141+ for a switching system including a time delay or retardation means for controlling a switch actuation and which may include motor means.
- 337, Electricity: Electrothermally or Thermally Actuated Switches, subclass 51, 81, 88, 127, 163, and 301 for electrothermal or thermally controlled switches with timing means which may be time controlled.
- 361, Electricity: Electrical Systems and Devices, subclasses 71+ for systems including circuit breakers with time delay means including clock work.

- 31** This subclass is indented under subclass 28. Subject matter wherein the timing or delay structure includes means whereby the time interval between the opening of the contacts and the reclosing thereof, resetting of the latch or permanent opening (lockout) of the main

contacts is controlled either wholly or in part by thermal means, such as a bimetallic element, for example.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 39+, for circuit interrupters with magnetic latch or trip means which may include thermal time delay means.
- 66, below for switches of the retarded or delayed type including thermally responsive delay means.
- 217+, for electromagnet and armature with temperature responsive type delay means.

SEE OR SEARCH CLASS:

- 337, Electricity: Electrothermally or Thermally Actuated Switches, subclass 301 for time controlled thermally responsive switches.
- 361, Electricity: Electrical Systems and Devices, subclass 99 for safety protective systems utilizing combined thermal-electromagnetic devices.

- 32** This subclass is indented under subclass 28. Subject matter wherein the timing or delay structure includes counting or integrating means whereby the time interval between the initial opening and the final reclosing operation or final opening (lockout) of the main contacts comprises a cycle of opening and reclosing operations or whereby the circuit completing contacts are normally latched in closed condition and released by a counting mechanism adapted to respond to successive fault current impulses until a predetermined number of such pulses after which the latch is released allowing the contacts to open.

SEE OR SEARCH CLASS:

- 361, Electricity: Electrical Systems and Devices, subclasses 71+ for safety protective systems utilizing subsequent automatic restoring means.

- 33** This subclass is indented under subclass 32. Subject matter wherein the timing or delay means includes significant structure whereby at least two of the cycles between the initial opening of the main contacts and the final opening or, lockout thereof, are of different duration. For example, the initial opening may be instan-

taneous while the succeeding cycles may be of longer duration or the initial opening may be delayed while the succeeding cycles may be of short duration.

- 34** This subclass is indented under subclass 32. Subject matter wherein the timing or delay means comprises significant structure whereby the main contacts are positively restrained from being reclosed after a given sequence of opening and reclosing operations.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 77, for motor operated switches with significant locking means.
113, for automatically actuated plural contact switches with locking or latching means.
157+, for other electromagnetically actuated switches with lockout (open) means.

- 35** This subclass is indented under subclass 21. Subject matter wherein the trip structure contains significant details of more than a single tripping device each one of which is responsive to a different condition or in which each is actuated by means operating upon a different principle. Also devices in which the current in the winding of a magnetic trip device is controlled by a bimetal, or other thermal means, which may be heated in response to current flow are also classified here.

- (1) Note. Generally the combination of a magnetic trip with a bimetallic means results in an instantaneous tripping action upon a large surge of current and a time delayed tripping action following a sustained overload.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 173, for other electromagnetically actuated switches with plural significant diverse tripping means.

SEE OR SEARCH CLASS:

- 361, Electricity: Electrical Systems and Devices, subclasses 1+ for miscellaneous circuit breaker systems, and subclass 114 for safety and protective

systems utilizing manual and automatic opening of a breaker.

- 36** This subclass is indented under subclass 35. Subject matter wherein the combined trip structure includes at least one element of structure common to or forming an integral part of each one of the plural separate tripping means.

- 37** This subclass is indented under subclass 35. Subject matter wherein the trip structure includes at least one thermal element, which element acts as a winding or flux source for a magnetic device. Usually, in the patents classified here, the thermal element acts as a delayed tripping device while the magnetic device operates instantly upon excessive current in the thermal device.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 141+, for other electromagnetically operated switches with additional thermal current responsive means.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclass 3 for multiple circuit control switches with thermal current responsive means.
361, Electricity: Electrical Systems and Devices, subclass 99 for safety and protective systems including devices with combined thermal electromagnetic relay means, one of which may act instantaneously.

- 38** This subclass is indented under subclass 21. Subject matter wherein the trip structure consists wholly or exclusively of magnetically operated means. The trip means may consist of plural magnets acting conjointly, single magnet means with a plurality of armatures or any other magnetic structure so long as the operating means consists of magnetic means only.

- (1) Note. For magnetic trip structure in general which performs the additional function of arc suppression or blow-out, the search should be extended to subclass 201 below.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

174, for electromagnetically actuated switches in general with significant magnetically actuated tripping means.

SEE OR SEARCH CLASS:

200, Electricity: Circuit Makers and Breakers, subclasses 12+ for dial type multiple circuit controllers with electromagnetic release, subclass 404 for double snap switches with magnetic latch trip, subclass 404 for single switches with magnetic latch trip.

219, Electric Heating, subclass 519 for automatically operated current connection or disconnection means for heating devices comprising electromagnetic relay means.

361, Electricity: Electrical Systems and Devices, subclasses 1+ and appropriate subclasses for safety and protective systems employing electromagnetic protective devices.

- 39** This subclass is indented under subclass 38. Subject matter wherein the trip structure includes significant means whereby the tripping operation is delayed for a predetermined interval of time after the occurrence of the circuit condition tending to cause such a tripping action. The significant time delay means may consist of a thermal or other restraining means, provided that, it acts directly upon the magnetically operated tripping means to thereby prevent the said magnetic means from performing a tripping operation during the period of restraint.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

35+, for plural trips or combined operating means for a single trip.

- 40** This subclass is indented under subclass 39. Subject matter wherein the significant time delay structure includes means responsive to the degree of overload occurring in the controlled circuit. For instance, the device may contain a first magnetic winding or armature actuated instantaneously upon a short circuit occurring and another winding or armature responsive to a continuous overload.

SEE OR SEARCH CLASS:

361, Electricity: Electrical Systems and Devices, subclasses 94+ for safety and protective systems employing a device having time delay actuating means combined with instantaneous control (e.g., responsive to the extent of the fault).

- 41** This subclass is indented under subclass 38. Subject matter wherein the magnetic flux producing winging of the magnetic trip structure either comprises a section of a conductor, which is directly in the controlled circuit or is connected in series with the main contacts.

- 42** This subclass is indented under subclass 38. Subject matter wherein the magnetic tripping means includes significant structure whereby the trip operating characteristics thereof may be adjusted or calibrated.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

45, for electromagnetic switch with adjustment or calibrating means for thermally actuated latch or trip means.
176, for other electromagnetically actuated switches with adjustable magnetic tripping means.

- 43** This subclass is indented under subclass 21. Subject matter wherein the trip structure consists wholly or exclusively of thermally actuated means. The thermal member or members in the device may be inductively heated or directly heated by current in the controlled circuit.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

35+, for trip actuating means comprising thermal means plus some additional means such as magnetic, mechanical or manual, operating means.
141+, for other electromagnetically actuated switches combined with thermal current responsive means.

SEE OR SEARCH CLASS:

200, Electricity: Circuit Makers and Breakers, subclass 3 for multiple circuit control switches with thermal current combined actuating means.

219, Electric Heating, subclasses 494+ for automatically regulated or controlled power supply systems for electric heaters with thermally responsive control means and subclasses 510+ for thermally responsive automatic current connection or disconnection means for heating devices.

337, Electricity: Electrothermally or Thermally Actuated Switches, appropriate subclasses for thermal current actuated switches with latch trip means.

361, Electricity: Electrical Systems and Devices, subclasses 1+ for safety and protective systems with thermal control means and subclasses 161+ for electric circuits for relays and electromagnets utilizing thermally actuated means.

44 This subclass is indented under subclass 43. Subject matter wherein the significant tripping structure includes means whereby the thermal actuating means is compensated for changes in ambient temperature to prevent unwanted change in the operating characteristics thereof.

SEE OR SEARCH CLASS:

361, Electricity: Electrical Systems and Devices, subclass 140 for electric circuits for relays and electromagnets including means for compensating for thermal changes.

45 This subclass is indented under subclass 43. Subject matter wherein the trip structure includes means whereby the current value necessary to cause a response of the control device, of the trip means, or the electromagnetic force necessary to permit the actuation of the contacts to open or closed condition, may be regulated, readily adjusted or calibrated.

SEE OR SEARCH THIS CLASS, SUBCLASS:

42, for electromagnetic circuit interrupters with adjustment or calibration of

magnetic latch or trip actuating means.

176, for electromagnetic switches in general with adjustable magnetically operated trip means.

46 This subclass is indented under subclass 6. Subject matter wherein the interrupting device includes significant structure whereby (1) rebound of the contacts upon opening or closing (2) any undesirable actuation of the contacts from one condition to another, either in response to abnormal circuit conditions or by jar or shock, is prevented, or (3) whereby the operating mechanism may be positively locked against undesirable circuit opening and/or closing movement.

SEE OR SEARCH THIS CLASS, SUBCLASS:

157+, for other electromagnetically actuated switches with locking or holding means.

193, for significant contact actuating structure with vibration, bounce or chatter prevention means.

271, for electromagnet with armature mounting means with bounce or vibration preventing means.

277, for electromagnet with armature with shock absorption, vibration or bounce preventing means in general.

47 This subclass is indented under subclass 2. Subject matter wherein the structure includes means whereby at least one electrical circuit is completed through a conductive liquid, usually mercury.

(1) Note. For purposes of classification a conductive fluid comprising a fluid dielectric with copper or other electrical conductive particles in suspension therein is considered as a conductive liquid classifiable in this or the indented subclasses.

SEE OR SEARCH CLASS:

200, Electricity: Circuit Makers and Breakers, subclass 32 for periodic switches of the liquid contact type; subclass 81.6 for fluid pressure operated switches of the liquid contact type; and subclass 152 for nonelectro-

magnetically controlled switches in general utilizing liquid contacts.

- (1) Note. Class 200, subclass 152 is the generic place for liquid contact (mercury) switches. To complete the search for this subject matter the search notes under that subclass definition should be consulted.
- 324, Electricity: Measuring and Testing, subclasses 92+ for devices for measuring, testing or sensing electricity, per se, and utilizing fluid conductors.
- 337, Electricity: Electrothermally or Thermally Actuated Switches, subclass 21, 114+, 306+, particularly subclasses 331 and 373 for electrothermal or thermally controlled switches utilizing liquid contacts.
- 361, Electricity: Electrical Systems and Devices, subclasses 500+ for electrolytic current interrupting systems and devices.
- 48** This subclass is indented under subclass 47. Subject matter wherein the structure includes a plurality of three or more electrodes through which a current may enter or leave the liquid or other contact means whereby at least two or more external electrical circuits may be completed through the device.
- (1) Note. Devices which, in fact constitute a plurality of separate mercury switches supported in a single group and which, may or may not depend upon a single magnet for actuation, are considered to come within the above subclass definition as special mercury switches. Devices of this type will have the original placed here and an official cross-reference placed in subclasses 159+ below.
- (2) Note. Normally patents having the original classified here or in any other of the special type groups below will not be crossed down into the general multiple contact subclasses 106+ below, unless the disclosed subject matter discloses contact structure which may be of general utility in switches other than the special type with which it is disclosed or claimed.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 8+, for automatic circuit interrupters of the polyphase or multiple type.
- 11, for automatic circuit interrupters of the plural switch type.
- 60, for retarded or delayed type electromagnetically actuated switches which complete plural circuits alternately, consecutively or selectively.
- 72, for switches with plural contacts.
- 88+, for periodically operative switches with means for completing plural circuits.
- 106+, for multiple type switching devices not restricted to the specific types listed above.
- 152, for plural vacuum or sealed switches.
- 159+, for plural switches.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclasses 1+, for multiple circuit switches in general, subclasses 19.06+ for periodic switches of the multiple contact type, and subclass 32 for periodic switches with liquid contact.

- 49** This subclass is indented under subclass 47. Subject matter wherein the structure includes means whereby an electrical circuit, or circuits, is completed when the conductive liquid is displaced from a first position in which the continuity of a conductive path between two or more electrodes is interrupted to a second position in which the path is completed through the liquid, the condition of the controlled circuit at all times being dependent upon the position of the liquid. The displacement means is generally of the magnetically controlled plunger type but may consist of means for tilting the chamber holding the liquid.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclass 32 for periodic switches with liquid contacts, subclass 80 for centrifugal switches which may use a displaceable liquid conductor for performing circuit controlling operations, and subclass 152

- for nonelectromagnetically operated mercury switches in general.
- 337, Electricity: Electrothermally or Thermally Actuated Switches, subclass 21 for electrothermal switches utilizing physical changes in a conductive fluid.
- 50** This subclass is indented under subclass 49. Subject matter wherein the structure includes at least two separate wells or containers each of which is adapted to hold at least a portion of the conductive fluid and in which the condition of the external circuit depends upon the presence of, or the amount of, liquid in one or the other or both containers.
- SEE OR SEARCH CLASS:
- 338, Electrical Resistors, subclasses 80+ for liquid resistor devices, especially subclass 81 wherein an electrode is separable from the liquid for switching and subclass 94 for devices for varying a resistance by means of a device having contacts adapted to be closed by a liquid.
- 51** This subclass is indented under subclass 49. Subject matter wherein the liquid displacement structure includes magnetic flux generating means acting either directly upon the liquid or upon other means such as a piston or plunger which in turn acts to displace the liquid.
- 52** This subclass is indented under subclass 51. Subject matter wherein the magnetically actuated liquid displacement means comprises a plunger or piston acting upon the liquid.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 56, for conductive liquid activities utilizing an armature structure comprising a freely floating slug or mass.
- 53** This subclass is indented under subclass 52. Subject matter wherein the structure includes a means in addition to the plunger whereby the circuit to be controlled may be maintained open or closed for predetermined interval of time.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 28+, for automatic circuit interrupters with latch or trip with timing means for reclosing or resetting.
- 39+, for automatic circuit interrupters with magnetic latch or trip control of the time delay type.
- 59+, for other electromagnetically actuated switches with time delay means.
- 139, for step-by-step switches with timing or indexing means.
- 218, for magnets or electromagnets of the temperature responsive type with time delay means.
- 239+, for electromagnet with time delay armature movement control means.
- SEE OR SEARCH CLASS:
- 200, Electricity: Circuit Makers and Breakers, subclasses 33+ for nonmagnetically actuated switches with time delay.
- 54** This subclass is indented under subclass 49. Subject matter wherein the liquid displacement means includes structure whereby liquid displacement is accomplished by tilting or rotating a chamber containing the liquid.
- SEE OR SEARCH CLASS:
- 200, Electricity: Circuit Makers and Breakers, subclass 17 for operating devices for plural circuit control switches which may utilize tiltable mercury tube means, subclass 32 for periodic switches (flashers) utilizing tiltable liquid conductor tube means, subclass 84 for float type switches having tiltable switches which may be of the liquid contact type, actuated by the motion of the float and subclass 152 for liquid contact switches which may be tiltable.
- 318, Electricity: Motive Power Systems, subclasses 119+ for oscillating motors which may be controlled by a tiltable mercury switch.
- 340, Communications: Electrical, subclass 331 for flashers which may utilize tiltable mercury switches.

- 361, Electricity: Electrical Systems and Devices, subclasses 160+ for thermal switches which may utilize tiltable mercury devices and forming an element of electrical circuits for relays or electromagnets.
- 455, Telecommunications, subclasses 230+ for selective control mechanism for radio receivers which may utilize tiltable mercury switch means.
- 55** This subclass is indented under subclass 47. Subject matter wherein the device includes significant armature structure, not comprised of the liquid itself, and whereby at least one movable contact is caused to complete an electrical circuit through the medium of a conductive liquid. The liquid may comprise the fixed contacts or electrodes or may be retained in a reservoir from which the fixed contacts are wetted by capillary or other action.
- SEE OR SEARCH CLASS:
- 313, Electric Lamp and Discharge Devices, subclass 150 for space discharge devices with at least one movable contact cooperating with a liquid electrode and subclasses 163+ for liquid electrode discharge devices.
- 56** This subclass is indented under subclass 55. Subject matter wherein the armature structure comprises a globule, a metallic slug or other mass of material movable in a fluid and responsive to a magnetic field and freely movable within the magnetic field in such a manner as to complete or open an electric circuit between contacts and entirely free of any mechanical securing means. The fluid may be air, nonconductive liquid or the conductive liquid itself.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 49+, for liquid displacement type conductive liquid switches, especially subclasses 52+ wherein magnetically moved piston or plungers are utilized.
- 82, for polarity responsive electromagnetic switches with floating armature (i.e., no fixed pivot).
- 280, for armature structure comprising balls, filings or granular material.
- 57** This subclass is indented under subclass 47. Subject matter wherein the device includes significant contact or electrode structural details.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 83, for polarized switches with significant contact structure.
- 97, for periodic switches with significant contact structure.
- 133+, for multiple contact type switches with significant contact structure.
- 154, for vacuum (reed) switches with significant contact or contact actuating means.
- 196+, for significant contact structure not peculiar to any of the specialized types above.
- SEE OR SEARCH CLASS:
- 200, Electricity: Circuit Makers and Breakers, subclass 166 for switch contact details.
- 58** This subclass is indented under subclass 57. Subject matter wherein the significant contact or electrode structure includes a mercury pool or a metallic member wetted with liquid mercury.
- 59** This subclass is indented under subclass 2. Subject matter wherein the device includes significant structure whereby the timing of the opening or closing of the switch contacts of the device takes place at an appreciable interval or intervals of time after an actuating force is applied to the contact actuating means or the timing is effected by varying the energizing current applied to the magnetic winding of the device.
- (1) Note. For devices which automatically interrupt an electrical circuit upon the occurrence of an abnormal condition arising in the circuit to be controlled and having timing or delay means, see subclasses 6+ above.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 28+, for automatic circuit interrupters with latch or trip means with timing means for reclosing or resetting.

- 39+, for automatic circuit interrupters with magnetic latch or trip control of the time delay type.
- 139, for step-by-step switches with timing or indexing means.
- 218, for magnets or electromagnets of the temperature responsive type with time delay means.
- 239+, for electromagnet with time delay armature movement control means.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclasses 33+ for nonmagnetically actuated switches with time delay means.
- 219, Electric Heating, subclasses 492+ for automatic regulating or control systems for heating devices utilizing timing or cycling means.
- 307, Electrical Transmission or Interconnection Systems, subclasses 141+ for switch actuation means with time delay or retardation means.
- 315, Electric Lamp and Discharge Devices: Systems, subclass 360 for time controlled electric lamp and discharge device systems.
- 318, Electricity: Motive Power Systems, subclass 141, 283+, 484+, 700+, and 727+ for various motor control switching systems with time delay means.
- 320, Electricity: Battery or Capacitor Charging or Discharging, subclasses 155+ for a battery charging circuit with time control.
- 322, Electricity: Single Generator Systems, subclass 18 for automatic control of generator or driving means having time delay in response.
- 337, Electricity: Electrothermally or Thermally Actuated Switches, subclasses 301+ for thermally actuated switches with time control means.
- 340, Communications: Electrical, subclass 815.30 for visual signalling devices with means for self cancelling after a fixed time interval.
- 361, Electricity: Electrical Systems and Devices, subclasses 1+ for safety and protective systems with time delay means, and subclasses 160+ for elec-

tric circuits for relays and electromagnets with time delay.

- 388, Electricity: Motor Control Systems, art collection 921 for motor control systems including time delay means.

60

This subclass is indented under subclass 59. Subject matter wherein the device comprises means whereby a plurality of two or more electric circuits are adapted to be energized alternately, consecutively or selectively.

- (1) Note. For multiple contact switches in general, such as automatic telephone switches, but not involving time delay, search subclasses 107+ below.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 8+, for automatic circuit interrupters of the multipole or polyphase type.
- 11, for automatic circuit interrupters of the plural switch type.
- 48, for conductive liquid switches with three or more contacts.
- 72, for motor actuated switches with three or more contacts.
- 88+, for periodic or vibratory switches with plural pairs of contacts.
- 107+, for multiple contact switches in general of the selectively sequentially, alternatively or intermittently actuated type. See (1) Note above.
- 152, for vacuum or hermetically sealed type plural switches.
- 159+, for plural independently operative switches in general.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclass 37 for multiple contact rotary retarded switches.

61

This subclass is indented under subclass 59. Subject matter wherein the delay structure comprises pneumatic means such as a dashpot, bellows, suction cup, etc., utilizing air or other gaseous fluids.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 29, for automatic circuit interrupters with latch or trip reclosing or resetting means utilizing fluid delay means.

- 62, for retarded or delayed switches utilizing hydraulic delay means.
- 240, for electromagnet with associated dashpot delayed armature.
- SEE OR SEARCH CLASS:
- 188, Brakes, subclasses 266+, for a fluid-resistance brake or dashpot of general utility.
- 200, Electricity: Circuit Makers and Breakers, subclass 34 for nonmagnetically actuated switches with dashpot retarding means.
- 318, Electricity: Motive Power Systems, and subclass 485 for automatic motor control means with dashpot control.
- 388, Electricity: Motor Control Systems, art collection 921 for motor control systems including time delay means.
- 62** This subclass is indented under subclass 59. Subject matter wherein the delay structure comprises means, operable under the influence of a liquid.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 29, for automatic circuit interrupters with latch or trip reclosing or resetting means utilizing fluid delay means.
- 61, for retarded switches utilizing pneumatic delay means.
- SEE OR SEARCH CLASS:
- 200, Electricity: Circuit Makers and Breakers, subclasses 81+ for fluid pressure operated switches.
- 307, Electrical Transmission or Interconnection Systems, subclass 118 for switching systems with fluid condition responsive means and subclass 144 for fluid pressure switch actuating means.
- 318, Electricity: Motive Power Systems, and subclass 485 for other automatic motor control means with dashpot or other mechanical delay means.
- 388, Electricity: Motor Control Systems, art collection 921 for motor control systems including time delay means.
- 63** This subclass is indented under subclass 59. Subject matter wherein the delay structure comprises magnetic means, per se, or mechanical elements which are magnetically controlled.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 38+, above, for automatic circuit interrupter devices with magnetic trip means with time delay.
- SEE OR SEARCH CLASS:
- 318, Electricity: Motive Power Systems, and subclass 487 for automatic motor control switches with electromagnetic time delay means.
- 388, Electricity: Motor Control Systems, art collection 921 for motor control systems including time delay means.
- 64** This subclass is indented under subclass 59. Subject matter wherein the delay structure comprises mechanical or inertia means or a mechanical movement.
- SEE OR SEARCH CLASS:
- 200, Electricity: Circuit Makers and Breakers, subclasses 33+ for mechanically retarded switches in general.
- 361, Electricity: Electrical Systems and Devices, subclasses 1+ for electromagnetic safety and protection systems with mechanical time delay means and subclasses 160+ for electric circuits for relays and electromagnets with mechanical time delay means.
- 65** This subclass is indented under subclass 64. Subject matter wherein the mechanical delay means comprises separate and independent motor means. The motor may be either electric or spring driven.
- (1) Note. Delay devices which are operated by an induction vane driven by the contact actuating magnet, or other magnet means forming a component of the switch, are classified in subclass 63 above.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 30, for automatic circuit interrupters with trip reclosing or resetting means uti-

- lizing mechanical motor delay control.
- 68+, below, for switches wherein the actuation of the main contacts is under the control of an electric motor.

SEE OR SEARCH CLASS:

- 185, Motors: Spring, Weight, or Animal Powered, appropriate subclasses for mechanical motors, per se, of the weight or spring actuated type.
- 200, Electricity: Circuit Makers and Breakers, subclasses 35+ for switches of the retarded type with motor driven clock train means.
- 318, Electricity: Motive Power Systems, and subclass 486 for automatic stopping or starting switches with pilot or servo-motor time delay means.
- 388, Electricity: Motor Control Systems, art collection 921 for motor control systems including time delay means.

- 66** This subclass is indented under subclass 59. Subject matter wherein the delay structure comprises means whereby the desired time interval transpiring between the application of a control signal and the contact actuation is determined by the heating of a thermal element, such as a bimetallic element for example, by an electric current.

- (1) Note. The subject matter to be found here is directed to the delay means for electromagnetically actuated switches. Where the switch actuator is thermal, classification of the thermal current actuated switches is in Class 200, subclasses 113+ and of the thermal actuated switches, is in Class 337, appropriate subclasses.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 31, for automatic circuit interrupters with latch or trip reclosing or resetting means utilizing thermal delay means.
- 35+, above, for combined trip structure, for circuit interrupting devices, with one means being thermal.
- 39+, for magnetic trip structure with thermal delay means.
- 43+, for thermal trip structure.

- 141+, for electromagnetic switch control means combined with thermal means.

SEE OR SEARCH CLASS:

- 307, Electrical Transmission or Interconnection Systems, subclass 117 for condition responsive switching systems responsive to light, heat, vibratory or radiant energy.
- 322, Electricity: Single Generator Systems, subclass 33 for automatic control means for a generator or driving means which is responsive to thermal conditions.
- 337, Electricity: Electrothermally or Thermally Actuated Switches, appropriate subclasses. See (1) Note above.
- 361, Electricity: Electrical Systems and Devices, subclasses 23+ for thermal protective devices, subclass 99 for safety and protection devices with combined thermal and electromagnetic relay delay means, and subclasses 160+ for thermal control means in electric circuits for relays and electromagnets.
- 374, Thermal Measuring and Testing, subclasses 187+ for expanding solid type and subclasses 201+ for expanding fluid thermometric devices in general.

- 67** This subclass is indented under subclass 59. Subject matter wherein the delay structure includes adjusting or regulating means whereby the time delay interval transpiring before the opening and or closing operation may be varied or controlled.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 45, for automatic circuit interrupters with latch or trip means utilizing adjustable thermal actuators.

- 68** This subclass is indented under subclass 2. Subject matter wherein the electromagnetic switch operating mechanism comprises or includes an electric motor or the combination of electromagnetic means with at least one rotating motor means, in addition to the electromagnetic means, whereby the main contacts are caused to be operated to either the open or closed position. The additional motor means

may consist of a spring motor operatively connected with an electromagnet.

- (1) Note. The electric motor structure to be found in this and the indented subclasses may be either of the direct current or alternating current variety. No effort has been made to distinguish between A.C. and D.C. in this subclass, the motor being merely the significant means for driving a particular class of switch. For alternating current switches of general utility without motor means the search will be in subclasses 99+ below.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 30, for automatic circuit breakers with mechanical motor controlled trip or latch.
- 65, for switches with motor controlled delay means.
- 118, for automatically actuated multiple contact switches of the telephone type which are motor driven.

SEE OR SEARCH CLASS:

- 185, Motors: Spring, Weight, or Animal Powered, for mechanical motors, per se, of the weight or spring actuated type.
- 200, Electricity: Circuit Makers and Breakers, subclasses 17+ for nonmagnetically operated multiple circuit control devices with motor operating means, subclasses 19.03+, 19.07+ and 19.18+ for rotary periodic switches, subclass 48 for significant structure comprising motor and related mechanisms rotatable to operate high potential electric switches, subclass 80 for centrifugal switches which may be motor driven and subclass 155 for rotating mechanical switches.
- 246, Railway Switches and Signals, subclass 99 for automatic railway block signalling systems which are clock work controlled, subclasses 221+ for electric motor systems for signal switch actuation, e.g., see also subclasses 102, 103 and 263 for mechanical motor systems.

310, Electrical Generator or Motor Structure, appropriate for specific electric motor structures.

315, Electric Lamp and Discharge Devices: Systems, appropriate subclasses for specific electric motor control systems.

69

This subclass is indented under subclass 68. Subject matter wherein the motor structure is reversible in direction or oscillates cyclically about a center position first in one direction and then the other.

SEE OR SEARCH CLASS:

318, Electricity: Motive Power Systems, appropriate subclasses for motor reversing systems. For example, see subclass 10 for particular motor driven load devices with reversible drive mechanism, subclasses 119+ for reciprocating or oscillating motor control systems and subclasses 280+ for motive power systems with motor reversing means.

70

This subclass is indented under subclass 68. Subject matter wherein the motor structure is either responsive to a predetermined frequency of the signalling or actuating current or operates at a speed corresponding to the frequency of the actuating current.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 94, for periodic switches with vibratory reeds tuned or resonant at a particular frequency.
- 101, below, for alternating current responsive switches which are synchronous frequency responsive.

SEE OR SEARCH CLASS:

318, Electricity: Motive Power Systems, appropriate subclasses, for electric motors having means for varying or adjusting frequency of the current applied thereto usually for speed control. See subclass 503 and the search notes thereunder for the general field of search for motors with armature current frequency or pulsation control.

- 334, Tuners, subclasses 20+ for motor operated tuners, particularly subclass 21 for predetermined frequency selector tuners.
- 361, Electricity: Electrical Systems and Devices, subclass 113 for safety and protective systems which are frequency responsive and subclasses 182+ for relay systems which are frequency responsive.
- 71** This subclass is indented under subclass 68. Subject matter wherein the device includes significant structure operated by the motor whereby the main contacts are actuated to or from an opened or closed condition.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 114, for plural contact telephone type switches with automatic rotary contact selecting means.
- 118, for motor driven automatic selector means.
- 121+, for significant means for actuating a plurality of contacts selectively, cyclically, alternately or intermittently.
- 185+, for other significant contact actuating structure.
- SEE OR SEARCH CLASS:
- 200, Electricity: Circuit Makers and Breakers, appropriate subclasses for rotary type contact actuating mechanisms, particularly subclasses 178+ for automatic telephone type switches with rotary contact selecting or actuating means.
- 72** This subclass is indented under subclass 71. Subject matter wherein the significant contact actuating structure comprises means whereby a plurality of external electrical circuits may be selectively completed by the device or in which a plurality of fixed contacts are selectively connected to one or more movable contacts by motor driven means.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 118, for multiple contact telephone type selector switch devices which are motor driven.
- 121+, for plural contact type electromagnetically operated switches with other significant contact actuating means.
- SEE OR SEARCH CLASS:
- 200, Electricity: Circuit Makers and Breakers, subclass 4 and 6+ for multiple circuit pivoted contact switches; subclasses 19.07+ for nonmagnetically actuated periodic switches with plural contacts; subclass 37 for clock train actuated rotary switches of the multiple contact type and subclasses 178+ for telephone type selector switches having a plurality of contacts adapted to be actuated by a motor driven selector means.
- 73** This subclass is indented under subclass 71. Subject matter wherein the contact actuating structure includes eccentric or cam means whereby at least one movable contact is actuated directly.
- (1) Note. For devices in which the movable contact or contacts are actuated by a spring or other energy storage means after the spring has been wound or cocked by means of a motor driven cam the search is in subclass 76 below.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 190, below, for other significant contact actuating structure comprising cam, roller or eccentric means.
- SEE OR SEARCH CLASS:
- 200, Electricity: Circuit Makers and Breakers, subclasses 19.03+ for combined rotary and cam operated periodic switches, subclass 19.13+ for cam operated multiple contact periodic switches, subclasses 19.20+ for cam operated periodic switches, subclass 38 for clock train, cam actuated retarded switches.
- 74** This subclass is indented under subclass 71. Subject matter wherein the contact actuating structure includes braking, clutch or detent means between the driving motor and the driven movable contact or contacts whereby the speed of the opening or closing operation,

the interval during which the driving and the driven means are connected or the degree of contact pressure may be controlled or whereby the device may be independently manually controlled.

SEE OR SEARCH CLASS:

- 188, Brakes, appropriate subclasses for mechanical brake structures and operating means therefor.
- 192, Clutches and Power-Stop Control, appropriate subclasses for clutches, motor and clutch control and power stop controls.
- 200, Electricity: Circuit Makers and Breakers, subclass 180 for telephone type selector switches with clutch controlled rotary motion.
- 307, Electrical Transmission or Interconnection Systems, subclass 142 for switching systems including switch actuating structure with braking means.
- 310, Electrical Generator or Motor Structure, subclasses 92+ for torque transmitting clutches or brakes.

- 75** This subclass is indented under subclass 74. Subject matter wherein the brake, clutch or detent means is magnetically operated.

SEE OR SEARCH CLASS:

- 310, Electrical Generator or Motor Structure, subclasses 103+ for torque transmitting clutches or brakes of the magnetic field type.

- 76** This subclass is indented under subclass 71. Subject matter wherein the contact actuating structure includes, mechanical energy storage means whereby the movable contact or contacts are actuated to or from the closed position, the energy storage taking place through the agency of a motor wound spring or other kinetic energy device. The energy storage means may actuate the contacts through mechanical gearing which comprises in itself all the elements of a spring motor; for example, a clock movement actuated switch is considered a motor driven switch for classification here provided the spring is recharged by electric motor means. The storage means may also consist of inertia means released by a motor

and transmitting energy via the force of gravity.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 14, for automatic circuit interrupting devices which may utilize a core armature moving under the influence of the force of gravity.
- 30, for automatic circuit interrupters with mechanical motor controlled latch or trip reclosing or resetting means.
- 65, for motor controlled (e.g., clock-work) switch actuation delay means.
- 116, for multiple contact telephone type switches with gravity actuated selector restoring means.

SEE OR SEARCH CLASS:

- 185, Motors: Spring, Weight, or Animal Powered, subclasses 4+ for plural weight actuated motors, subclasses 9+ for plural spring actuated motors, subclasses 27+ for weight actuated motors, per se, and subclasses 37+ for spring motors, per se.
- 200, Electricity: Circuit Makers and Breakers, subclasses 17+ for plural circuit control switches with significant operating means, subclasses 35+ for clock train actuated retarded switches, subclasses 85+ for weight actuated switches and subclasses 502+ for mechanical switch actuating means.
- 246, Railway Switches and Signals, subclasses 221+ for motor systems for railway electric switch and signal actuation which may employ energy storage means.
- 307, Electrical Transmission or Interconnection Systems, subclasses 139+ for switching systems having switches with particular actuation means which may include energy storage means.
- 318, Electricity: Motive Power Systems, subclasses 445+ especially subclasses 457 and 462, for automatic motor control switches with energy storage means.

- 77** This subclass is indented under subclass 68. Subject matter wherein the structure includes significant means whereby the contacts or the

contact actuating means may be positively locked or latched to prevent any desired movement during the existence of a predetermined condition of the switch, such as open or closed. The locking or latching means will generally be provided with tripping structure to allow the latch to be released upon the termination of the predetermined condition.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 21+, above, for automatic circuit interrupters with significant latch or trip means.
- 113, for multiple contact switches with holding, locking or latching means.
- 157+, for significant locking or holding structure.
- 167+, for other electromagnetically actuated switches with significant latch means.
- 172+, for switches with tripping means.
- 253+, for electromagnet and armature with armature latch means.

- 78** This subclass is indented under subclass 2. Subject matter wherein the structure comprises circuit connection devices in which the movement of an armature depends upon the direction of the voltage or current flowing in the circuit controlling the armature. Usually the devices comprise an operating magnet associated with a permanent magnet or a constantly-energized electromagnet.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 179, for electromagnetic actuated switches employing a permanent magnet in addition to an electromagnet.
- 222, for relatively movable coil and permanent magnet.
- 229+, for magnets and electromagnets with armature utilizing permanent magnets, especially subclasses 230+ for the polarized type.

SEE OR SEARCH CLASS:

- 178, Telegraphy, subclass 93 for polarized code receivers and subclasses 101+ for telegraph keys involving a polarized relay.

- 310, Electrical Generator or Motor Structure, subclasses 152+ for the structure of rotary dynamo-electric machines with permanent magnets.
- 318, Electricity: Motive Power Systems, subclasses 555+ for three or more position motor controlled systems which may be electromagnetically actuated and may employ polarized relays.
- 361, Electricity: Electrical Systems and Devices, subclass 76 for protective systems with phase sequence analyzer; subclass 77 for protective systems responsive to reverse phase; subclasses 78+ for protective systems of the reverse energy or reverse current type; and subclass 208 for electrical control circuits for polarized relays and electromagnets.

- 79** This subclass is indented under subclass 78. Subject matter wherein the switch comprises within itself or forms an essential component of, a device into which information, in the form of an electric signal, can be introduced for extraction at a latter time, the switch being transferred to one or the other of its conditions depending upon the polarity of the energization current and remains in that condition subsequent to deenergization until reset.

- (1) Note. The subject matter to be found here relates only to devices which essentially comprise a switching means whereby an interval of time occurs between the application of an input signal and the eventual completion of a circuit between input and output terminals or wherein the contacts are closed upon the application of a pulse of one polarity and held closed until the subsequent application of a pulse of another polarity.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 157+, for other electromagnetically actuated switches with locking or holding means.

SEE OR SEARCH CLASS:

- 307, Electrical Transmission or Interconnection Systems, subclasses 401+ for magnetic storage devices.

- 326, Electronic Digital Logic Circuitry, appropriate subclasses for a transistorized logic circuit.
- 327, Miscellaneous Active Electrical Non-linear Devices, Circuits, and Systems, subclasses 185+ for a miscellaneous stable state circuit such as a bistable circuit.
- 365, Static Information Storage and Retrieval, appropriate subclass for read/write storage systems comprising magnetic storage elements.
- 80** This subclass is indented under subclass 78. Subject matter wherein the device includes significant armature structure specifically adapted for use in a polarity responsive device.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 95+, for armature structure for periodic switches.
- 203, for significant armature structure for electromagnetically actuated switches.
- 232+, 234 and 235, for significant armature structure in polarized electromagnet with armature.
- 279+, for armature shape, structure and material.
- SEE OR SEARCH CLASS:
- 361, Electricity: Electrical Systems and Devices, subclass 208 for electric circuits for a polarized relay which relay may have significant armature structure.
- 81** This subclass is indented under subclass 80. Subject matter wherein the significant armature structure includes means whereby the armature is supported in such a manner as to be freely movable within an axial cavity of a coil or within the flux field set up between pole faces. The motion may be rotary around an axis or may be generally parallel with the axis of the coil or in a plane in the direction of the axis.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 270+, for relays with significant armature mounting means.
- 82** This subclass is indented under subclass 80. Subject matter wherein the armature is not permanently attached at a fixed point, therefore, being free to move in each of several directions.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 56, for conductive liquid switches having armature comprising a freely movable floating slug or mass.
- 280, for significant armature structure comprising a ball, granular material or magnetic filings.
- 83** This subclass is indented under subclass 78. Subject matter wherein the device includes significant contact structure or composition particularly adapted for use in a polarized type switch.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 56+, for switches utilizing conductive liquid with particular contact or electrode structure.
- 94, for periodic switches with particular contact arrangement or composition.
- 133+, for multiple contact switches with particular contact structure or arrangement.
- 196+, for other significant contact structure not peculiarly adapted to a particular type switch.
- 84** This subclass is indented under subclass 78. Subject matter wherein the device includes significant magnetic structural elements or materials of construction and which are particularly applicable to polarized systems.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 227, for saturable electromagnet with armature.
- 230+, for permanent magnet polarized electromagnet with armature.
- 296+, for significant magnetic structure or compositions and not peculiarly adapted for a specific type switch or relay.

- 85** This subclass is indented under subclass 84. Subject matter wherein the significant magnetic structure recited comprises particular pole structure.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

281, below, for other significant magnetic pole structure.

- 86** This subclass is indented under subclass 78. Subject matter wherein the structure includes means whereby some feature of the device, such as the air gap, pole pieces, contacts, value of the actuating current or armature neutral position, may be adjusted or regulated.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

212, for electronic and ionic beam deflecting magnets or electromagnets with adjustable magnetic element.

298, for magnet core structure in general with movable or adjustable core.

- 87** This subclass is indented under subclass 2. Subject matter wherein the device comprises means whereby a circuit is completed and broken intermittently or cyclically at constantly recurring intervals under the influence of a magnetic flux field.

- (1) Note. The switches found here and in the indented subclasses below are analogous to the converters (choppers) utilized in Class 363, subclasses 106+ and subclass 124 where the circuit interrupter forming a component of a Class 363 system is defined as a "periodic switch".

SEE OR SEARCH THIS CLASS, SUB-CLASS:

107+, below, for multiple contact type switches having plural contacts which are selectively, cyclically, alternately or intermittently actuated.

151+, for hermetically sealed reed switches which may be cyclically actuated.

SEE OR SEARCH CLASS:

200, Electricity: Circuit Makers and Breakers, subclasses 19.01+ for periodic circuit breakers generally.

307, Electrical Transmission or Interconnection Systems, subclass 132 for repetitive make and break switching systems.

310, Electrical Generator or Motor Structure, subclasses 15+ for reciprocating or vibrating electric motors comprising a magnet, an armature and a contact arrangement causing vibration or periodic motion of the armature when the magnet circuit is closed.

315, Electric Lamp and Discharge Devices: Systems, subclasses 209+ for systems having a periodic switch in the supply circuit of a load or loads.

318, Electricity: Motive Power Systems, subclass 37 for plural reciprocating or oscillating electric motor systems and subclasses 119+ for single reciprocating or oscillating motor systems, especially indented subclass 134 for motor systems with circuit making or breaking devices in the energizing circuit.

361, Electricity: Electrical Systems and Devices, subclasses 1+ for circuit interrupting systems, subclasses 139+ for periodic circuits for relays and electromagnets, and subclasses 245+ for automatic pole changers.

363, Electric Power Conversion Systems, subclass 110 for an inverter system comprising a vibrator means.

- 88** This subclass is indented under subclass 87. Subject matter wherein the structure includes a plurality of devices falling under the definition of subclass 87 but forming a single assembly or single entity under the class definition or a single device having a plurality of pairs of contacts whereby two or more separate and distinct electrical circuits may be completed through the device. This subclass does not include those devices which comprise a single movable contact which alternately contacts each of two fixed contacts thereby varying the direction of current in the two conductors of a single circuit.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

107+, for plural contact alternating current operated type switches under the class definition for actuating a plurality of external circuits cyclically or successively.

SEE OR SEARCH CLASS:

200, Electricity: Circuit Makers and Breakers, subclasses 23+ for periodic switches in general and having plural contacts.

- 89** This subclass is indented under subclass 88. Subject matter wherein the structure includes means whereby the plurality of contacts are actuated in such a manner as to complete each one of a plurality of circuits selectively, alternately or consecutively.

SEE OR SEARCH CLASS:

315, Electric Lamp and Discharge Devices: Systems, subclasses 209+, especially subclass 217, for plural load device systems having a periodic switch in the supply circuit.

- 90** This subclass is indented under subclass 87. Subject matter wherein the structure includes means whereby the amplitude of the vibrator or periodic motion, the natural resonant frequency of the vibratory element, or equalization of the periods between the engagement of the movable contact and each one of fixed contacts is controlled or set.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

46, for automatic circuit interrupters with contact rebound prevention means.
104, for alternating current operated type switches with chatter, bounce or vibration prevention means.
193, for contact vibration, bounce or chatter prevention means in general.
271, for armature bounce or vibration preventing means in general.

SEE OR SEARCH CLASS:

200, Electricity: Circuit Makers and Breakers, subclass 19.05, 19.11, 19.19, and 19.21+ for other periodic switches with adjusting means.

- 91** This subclass is indented under subclass 87. Subject matter wherein the structure comprises significant magnetic structure or material peculiarly adapted for use in a periodic or cyclic switch.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

205+, for switch structure, not restricted to a specialized subclass, utilizing a permanent magnet or magnets.
296, significant magnet structure not specifically restricted to use in electromagnetic switches.

- 92** This subclass is indented under subclass 91. Subject matter wherein the magnetic structure includes at least two or more distinct magnetic means which may or may not be of diverse type and each of which performs its particular function independently of the other. For example, one magnetic means may consist of fluctuating magnetic field generating means for actuating an armature or reed while the other consists of a permanent magnet providing a biasing means for the armature or reed.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

177+, below, for other electromagnetic switches utilizing plural magnets.
266+, for magnets or electromagnets and armatures with plural coils or magnets.
306, for the structure of plural permanent magnets, per se.

- 93** This subclass is indented under subclass 87. Subject matter wherein the structure includes significant vibratory reed or other periodically actuated means whereby a movable contact or contacts is periodically caused to engage one or more fixed contacts. The vibratory reed or other actuating structure may be unitary with or comprise the armature of the magnet means and still be classified here as long as the motion of the movable contact is directly

responsive to or proportional to the movement of the armature.

- (1) Note. Armature structure peculiar to the subclass 87 special type switch and separate from the contact actuating reed, or other means, is classified in subclasses 95+.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 154, for reed switches with significant contact actuating structure where the reed may also act as an armature.
185+, for other electromagnetic switches with significant contact actuating means.
235, for polarized electromagnet with vibrating reed or spring bar armature.

SEE OR SEARCH CLASS:

- 84, Music, subclass 409 for tuning forks, per se.
178, Telegraphy, subclasses 47+ for telegraph transmitters or receivers utilizing vibrating reeds.
310, Electrical Generator or Motor Structure, subclass 25 for reed type reciprocating motor structures and subclasses 32+ for self actuated interrupter devices utilizing flat spring armatures.
324, Electricity: Measuring and Testing, subclass 76.49 for frequency meters utilizing tuned reeds.
331, Oscillators, subclass 156 for oscillators with vibrating reed or string type electromechanical resonators.
333, Wave Transmission Lines and Networks, subclasses 186+ for electro-mechanical transducer type (tuning fork) electric wave filters.

- 94** This subclass is indented under subclass 93. Subject matter wherein the vibratory reed or other contact actuating means is pretuned or inherently resonant at a particular predetermined frequency or band of frequencies.

- (1) Note. Tuned mechanical resonators such as reed or piezo crystal devices when used as means for measuring the frequency of a cyclic current will be found in Class 324, especially subclass 76.49,

and electrical wave filters of the electro mechanical transducer type will be found in Class 333, subclasses 186+.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 101, below, the alternating current responsive switches which are responsive to a predetermined or synchronous frequency.

- 95** This subclass is indented under subclass 87. Subject matter wherein the structure includes significant and specific details of the armature element or material of construction distinct from the vibratory reed or contact actuating means.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 55+, for conductive fluid type switches with particular armature structure.
80+, for polarity responsive switches with particular armature structure.
93, for significant vibratory reed structure.
124, for multiple contact switches with particular armature structure.
154, below, for armature structure for plural vacuum switches of the reed type.
203, below, for armature details, per se.
249, for alternating current electromagnet with special armature construction or mounting means.
261, for electromagnet with plunger type armature of particular structure or material.
279, for armature shape, structure or material in general.

- 96** This subclass is indented under subclass 95. Subject matter wherein the structure includes means whereby some operating characteristic, physical dimension or element of the armature is adjustably variable.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 144, for electromagnetic switch combined with an electrothermal actuator and having means to position or adjust the armature.

- 258, for electromagnet and plunger armature with stroke adjustment for the armature.
- 273, for electromagnet and armature with armature biasing means or bias adjustment means.
- 97** This subclass is indented under subclass 87. Subject matter wherein the structure includes significant and specific details of the contact structure or material of construction thereof. For purposes of classification in this subclass, contact supporting, holding and adjusting means are considered contact structure.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 57+, for conductive liquid switches with particular contact or electrode structure.
- 83, for polarity responsive switches with particular contact structure or composition.
- 133+, for multiple contact switches with particular contact structure or arrangement.
- 154, for reed switches with significant contact structure.
- 196+, for contact structure applicable to electromagnetic switches in general.
- 98** This subclass is indented under subclass 97. Subject matter wherein the contact structure includes adjustment means whereby some operating characteristic, physical mounting or element may be adjustably varied.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 194+, for contact actuating means with contact pressure maintaining or adjusting means.
- 197, below, for adjustable contact structure which is not peculiarly adapted for use with any particular type switch means.
- SEE OR SEARCH CLASS:
- 200, Electricity: Circuit Makers and Breakers, subclass 166 for details of contact structure for nonmagnetically actuated switches.
- 99** This subclass is indented under subclass 2. Subject matter wherein the device is specifically adapted for operation by an alternating, pulsating or fluctuating current. The actuating current may be a periodic current, the average value of which over a given period is zero and which varies according to a sinusoidal function, a bi-directional current which has both positive and negative values, or a periodic current which is the sum of a direct current and an alternating current.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 68+, for switch actuating means comprising an induction motor whose armature comprises a vane making at least one complete revolution about its axis.
- 231, for polarized electromagnet responsive to the varying amplitude of an alternating current.
- 243+, for electromagnets and armature of the alternating current type.
- SEE OR SEARCH CLASS:
- 361, Electricity: Electrical Systems and Devices, subclasses 1+ and appropriate subclasses, for safety and protective systems which may be AC responsive and subclasses 139+ for alternating current circuits for relays and electromagnets.
- 100** This subclass is indented under subclass 99. Subject matter wherein the contact actuating means comprises, or is responsive to, a device which derives its operative torque by magnetic induction from a winding or windings carrying alternating current, by the magnetic reaction between a current flowing in a rotor and an external flux path or by the magnetic repulsive force between magnetic flux sources.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 68+, especially indented subclass 70, for induction or synchronous type switch contact operators of the continuously rotating motor type (e.g., induction or synchronous motor).
- 224+, for magneto-mechanical motive device of dynamometer type utilizing

an induced current movable conductor (e.g., eddy current number).

SEE OR SEARCH CLASS:

- 310, Electrical Generator or Motor Structure, subclasses 105+ for torque transmitting clutches or brakes with induced or eddy current magnetic field and subclasses 166+ for the structure of induction type dynamo-electric machines in general.
- 318, Electricity: Motive Power Systems, subclasses 727+ for induction motor control systems in general.
- 324, Electricity: Measuring and Testing, subclasses 137+ for eddy current rotor meters (e.g., AC integrating watt hour meter type instruments).

101 This subclass is indented under subclass 99. Subject matter wherein the device is adapted to selectively operate at a predetermined frequency of the alternating operating current or wherein resonant vibration of a tuned reed armature will only occur when the cyclic period of the alternating current is the same as the resonant frequency of the tuned reed.

- (1) Note. A large number of the patents found here are analogous to those to be found in subclass 94 above, the difference residing in the fact that in this subclass the vibrating member is comprised of the armature itself while in the vibrator group above the armature is generally separate from the vibratory contact actuating means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 70, for frequency responsive or synchronous motor switch actuating means.
- 78, for polarized relays which may utilize in alternating current source for the magnetic coil.
- 93+, for switches of the vibratory type which may or may not be restricted to alternating current operation.
- 243+, for alternating current responsive electromagnets with vibrating armature structure.

SEE OR SEARCH CLASS:

- 178, Telegraphy, subclasses 47+, for harmonic or vibrating reed type telegraph transmitter or receiver means.
- 307, Electrical Transmission or Interconnection Systems, particularly subclass 87 for frequency responsive connecting and disconnecting plural supply systems and subclass 129 for frequency responsive switching systems in general.
- 310, Electrical Generator or Motor Structure, subclass 25, for tuned reed type motors or generators and subclasses 162+, for synchronous motor or generator structures.
- 318, Electricity: Motive Power Systems, subclasses 700+ for synchronous motor control systems.
- 361, Electricity: Electrical Systems and Devices, subclasses 160+ for frequency responsive relay systems, particularly subclasses 171+ for code responsive electric circuits for relays, and subclass 183 for plural relays that are frequency responsive.

102 This subclass is indented under subclass 99. Subject matter wherein the device is specifically adapted to operate in response to the currents in the respective phases of a multiphase or polyphase system, whereby one polyphase network is connected to another similar polyphase network through the device or wherein the device consists of a plurality of magnetic windings and having supplied to each winding an operating current at a phase angle different from that applied to each of the others.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 8+, for polyphase automatic circuit interrupter devices.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, appropriate subclasses for nonmagnetically operated switches of the multiphase type.
- 307, Electrical Transmission or Interconnection Systems, subclasses 13+ for polyphase systems in general that may

- include phase switches. An sub-classes 112+ for plural phase switches especially indented subclass 127 for phase sequence responsive type.
- 361, Electricity: Electrical Systems and Devices, subclasses 1+ for safety and protection systems which may utilize plural phase type devices.
- 103** This subclass is indented under subclass 99. Subject matter wherein the electromagnetic operating means includes a plurality of magnetic flux sources.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 8+, for automatic circuit interrupters of the multipole or polyphase type.
- 92, for vibratory type switches with plural magnets.
- 136, for multiple contact type switches with plural magnet or coil means.
- 149, for electrodynamic type switch operators utilizing plural relatively movable coils.
- 177+, for electromagnetically operated switches generally employing plural magnets.
- 207, for permanent magnet actuated switches utilizing plural permanent magnets.
- 222, for relatively movable coil and permanent magnet.
- 223+, for plural relatively movable coil devices (e.g., dynamometer type).
- 230+, for permanent magnet polarized electromagnet and armature.
- 246, for alternating current type electromagnetic motive devices with plural windings.
- 104** This subclass is indented under subclass 99. Subject matter wherein the structure includes means whereby the contacts of the device are prevented from chattering due to counter electromotive forces in the circuit or other causes, rebounding upon closing or whereby the armature is prevented from rocking or vibrating due to the pulsating force in the operating coil when energized by alternating current.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 46, for automatic circuit interrupting devices with rebound or chatter prevention means.
- 193, for significant contact actuating structure including vibration, bounce or chatter prevention means.
- 247+, for alternating current electromagnet and armature, per se, with chatter or noise preventing means.
- 271, for electromagnet and armature mount in general with armature bounce or vibration preventing means.
- 277, for magnetomechanical motive device in general with shock absorption, vibration or bounce preventing means.
- 105** This subclass is indented under subclass 99. Subject matter wherein the structure includes means whereby at least one element of the device, or some operating characteristic is adjustable either at will or permanently, the extent of movement of either the armature or the movable contact is adjusted or regulated, or whereby the speed of such movement is controlled.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 67, for retarded or delayed type switches with adjustable or regulatable features.
- 86, for polarity responsive switches with regulating means.
- 90, for periodic switch with adjustable vibrating element.
- 132, for multiple contact type with adjustable or replaceable structure.
- 144, for electromagnetically combined with electrothermal actuator and having means to position or adjust the armature.
- 197, for adjustable or readily detachable contact structure.
- 212, 250, 273, 287, 295, and 298, for various electromechanical motive devices or holding magnets with adjustable features.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclass 170 for nonmagnetically actuated switches with contact pressure adjusting means.
- 361, Electricity: Electrical Systems and Devices, subclass 206 for relay systems having relays with contact pressure increasing means.

106 This subclass is indented under subclass 2. Subject matter wherein the switch structure includes a plurality of fixed contacts each one of which, either singly or in a common group, is adapted to be connected to a separate independent external electrical circuit in such a manner that upon being contacted by a movable contact, or contacts, operated by the magnetic control means, a separate distinct electrical circuit is completed therethrough.

- (1) Note. For purposes of classification in this or the indented subclasses auxiliary contacts, whose purpose is to control some function of the switch itself, in addition to main circuit controlling contacts, are not considered as comprising plural contacts.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 8+, for automatic circuit interrupters of the multiple or polyphase type.
- 11, for plural switch structures of the automatic circuit interrupter type.
- 48, for liquid contact switches with three or more contacts.
- 60, for retarded switches with plural sets of contacts.
- 72, for motor actuated switches of the plural contact type.
- 88, for periodic switches with plural pairs of contacts.
- 102, for alternating current switches of the polyphase type.
- 152, for the combination of plural of vacuum or sealed type switches.
- 206, for the combination of plural permanent magnet actuated switches.

SEE OR SEARCH CLASS:

- 178, Telegraphy, particularly subclass 102 for multiple contact devices peculiarly adapted for telegraph keying.
- 200, Electricity: Circuit Makers and Breakers, subclasses 1+ for multiple circuit control devices generally.
- 307, Electrical Transmission or Interconnection Systems, appropriate subclasses for plural circuit switching systems in general, particularly subclasses 33+ for selectively connected load circuits, subclasses 85+ for selectively connected electric sources, and subclasses 112+ for miscellaneous switching systems, indented subclasses 113+ for providing for plural switches.
- 314, Electric Lamp and Discharge Devices: Consumable Electrodes, subclass 2 for current shifting switches.
- 315, Electric Lamp and Discharge Devices: Systems, subclasses 211+ for a periodic switch in the supply circuit of a plurality of load devices.
- 338, Electrical Resistors, subclasses 92+ for a multipart resistor with switch means whereby portions of the resistive material may be short circuited.
- 361, Electricity: Electrical Systems and Devices, subclasses 139+ for systems for selectively controlling a plurality of relays or electromagnets.
- 370, Multiplex Communications, subclasses 304+ for multiplexing systems which include rotary distributor switches, and subclass 531 for multiplexing systems which include magnetic core switching.

107 This subclass is indented under subclass 106. Subject matter wherein the structure includes significant means whereby individual contacts connected to external circuits may be actuated in such a manner that a plurality of individually controlled circuits are completed through the device selectively, sequentially, or alternately.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 60, for delayed operation switches with plural sets of contacts alternately or selectively opened or closed.
- 89, for periodic switch devices with plural pairs of selectively or alternately actuable.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclasses 19.06+ for non-magnetically actuated periodic switches with multiple contacts.
- 307, Electrical Transmission or Interconnection Systems, especially subclass 29 for plural source systems with selectively connected loads of sources, subclass 37 for serially connected load circuits with selective series parallel connections, subclasses 38+ for selectively connected load circuits and indented subclass 41 for sequential or alternating connected load circuits, and subclasses 80+ for selectively connected sources.
- 315, Electric Lamp and Discharge Devices: Systems, subclass 226 for a periodic multiple contact switch in the supply circuit of an electric lamp or other discharge device.
- 340, Communications: Electrical, subclasses 806+, for systems wherein a plurality of contacts are selectively actuated, to control energization of a display system.
- 341, Coded Data Generation or Conversion, subclasses 22+ for a selective switch array controlling a pulse code transmitter.
- 361, Electricity: Electrical Systems and Devices, subclasses 166+ for selectively or sequentially actuated relays.

- 108** This subclass is indented under subclass 107. Subject matter wherein the contact actuating structure comprises self-acting means, operating by its own self-contained mechanism when actuated by some impersonal influence, as for example, a change in current strength or a signalling current or voltage transmitted from a distance, which is not manual and requiring personal intervention, i.e., not requiring the

presence of an operator. The art to be found in this and the indented subclasses is analogous to the automatic telephone type switching arrangements to be found in Class 379, subclasses 16+; but which is of general application and not restricted to any one art device specifically otherwise classifiable. The devices classified here may utilize mechanical structure for the actuation of the main contacts which are to be controlled, provided that the primary instigating means comprises electromagnetic or other magnetic means.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclasses 175+ for multiple contact switches analogous to those found here and in the indented subclasses but not claimed as electromagnetically actuated.

- 109** This subclass is indented under subclass 108. Subject matter wherein the contact actuating structure comprises a movable contact or wiper means movable in more than a single direction whereby the contacts are selectively chosen. The movement may comprise any combination of vertical, rotary, radial or other motions. The two or more directional movements are usually accomplished by means of separate magnet devices each operating separately in response to a given condition in the device.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclasses 176+ for similar switching devices not specifically claimed as electromagnetically controlled.

- 110** This subclass is indented under subclass 109. Subject matter wherein the device includes means, in addition to the directional driving mechanism, whereby motion in a first direction is converted to a motion in a second direction.

SEE OR SEARCH CLASS:

- 74, Machine Element or Mechanism, appropriate subclasses for mechanical motion conversion means, per se.

- 111** This subclass is indented under subclass 109. Subject matter wherein the structure includes details of at least one device which, in response

to the appropriate control signals, connects one input path to one of a number of output paths, or alternatively, one of a number of input paths to one output path.

- (1) Note. To complete the search for this subject matter consult the search notes for subclass 109, above.

- 112** This subclass is indented under subclass 111. Subject matter wherein the structure includes a device having a plurality of contacts arranged in a vertical path, a plurality of contacts arranged in a plurality of horizontal paths and an electromagnetically operated means for interconnecting any one or any group of the vertically arranged contacts with any one or any group of the horizontally arranged contacts.

SEE OR SEARCH CLASS:

- 340, Communications: Electrical, subclasses 14.1 through 14.69 for selective systems utilizing decoder matrix type (e.g., crossed gratings) switching devices.

- 113** This subclass is indented under subclass 108. Subject matter wherein the device includes holding, latching or locking means whereby a selected set of movable contacts or a brush is caused to lock onto a particular bank of contacts or a single contact in a given bank when moved to an operated condition and remain in the operated condition until released by some external actuating means or signal.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 21+, for automatic circuit interrupters with latch or trip means.
77, for motor actuated switches with locking latch or tripping structure.
164, for switches having manually or force of gravity operated latch with electromagnetic trip.
166, for switches with reset means for latch or trip.
167+, for switches with latching means.
172+, for switches with tripping means.
253+, for electromagnet and armature with latch means.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclasses 175+ for similar switching devices not peculiarly adapted for telephone systems and not claimed as being electromagnetically actuated.

- 114** This subclass is indented under subclass 108. Subject matter wherein the structure includes significant means whereby contact selection is accomplished by movement of a selector mechanism movable in a rotary manner in a single plane, as for example, circular movement in a horizontal plane.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 72, for motor driven switches of the plural contact type.
122, for plural contact selective switches with contact actuator of the rotary type.
130, for simultaneously actuated plural contact switches with movable contacts on a circular card or comb structure.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclasses 1+ for similar switches not utilizing electromagnetic control means and periodic switches having plural contacts with rotary selector means.

- 115** This subclass is indented under subclass 108. Subject matter wherein the structure includes means whereby one or more carriers for the contact selecting means is caused to move or reciprocate in a single plane. The motion is usually in a vertical plane.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 126, for multiple contact switches in general wherein the contact actuator reciprocates or slides.
129, for switches comprising simultaneously actuated movable contacts on a slidable card or comb.

SEE OR SEARCH CLASS:

200, Electricity: Circuit Makers and Breakers, subclass 16 for multiple circuit control switching, device with reciprocating contact means.

- 116** This subclass is indented under subclass 108. Subject matter wherein the structure includes positive acting means whereby, after the completion of a contact selection operation, the selector is automatically returned to an initial position in readiness for a further selection operation.
- 117** This subclass is indented under subclass 108. Subject matter wherein the structure comprises means whereby the wiper or contact selector is caused to be advanced in steps of different lengths or intervals covering variable numbers of terminals or contacts. The structure included here includes devices having a single operating mechanism for moving a brush set in one direction in steps of one length and in another direction in steps of another different length.
- 118** This subclass is indented under subclass 108. Subject matter wherein the structure includes significant electric motor means whereby the selector actuating means is driven in response to an input signal.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

68+, for electric motor driven switches, especially subclass 72 for switches including plural contacts.

SEE OR SEARCH CLASS:

200, Electricity: Circuit Makers and Breakers, subclass 17 for multiple control switches with significant operating means which may comprise an electric motor.

- 119** This subclass is indented under subclass 107. Subject matter wherein the contact control operation is accomplished through the actuation of a plurality of armatures either acting conjointly to operate a single contact actuating means or each individually operating a separate contact actuating means. The structure found in this subclass may include a plurality of mag-

netic coils each operating one of the plurality of armatures or a single coil driving two or more armatures.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 177+, for switches utilizing plural coils or flux sources or armatures.
- 232+, for polarized electromagnet with plural armatures.
- 242, for electromagnet having plural armatures with means to selectively retard them.
- 259, for electromagnet with plural plunger armatures.
- 265, for electromagnets having plural armatures actuated by a single coil.
- 267, for electromagnets having plural coils driving plural armatures.

- 120** This subclass is indented under subclass 119. Subject matter wherein the structure includes interlocking or mechanical means whereby the armatures are caused to be operated in unison or whereby one or both are adapted to exercise control over the other thereby causing the completion of selected electrical circuits through the device in the proper sequence.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 160+, for plural independently operative switches with interlocking means.
- 233, for polarized electromagnet with plural armatures having armature locking means.

SEE OR SEARCH CLASS:

361, Electricity: Electrical Systems and Devices, subclasses 160+ for relays or electromagnets with plural armatures having interlocking means, particularly subclasses 191+.

- 121** This subclass is indented under subclass 107. Subject matter wherein the structure includes significant means, operatively connected to or combined with an armature, whereby the plurality of contacts are actuated from a first to a second or subsequent condition thereby completing selected circuits through the device.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 71+, for motor operated switches with significant contact actuating means.
- 138+, for step-by-step switches with significant contact actuating means.
- 185+, for significant contact actuating means not specifically adapted for use in any particular type switch.

- 122** This subclass is indented under subclass 121. Subject matter wherein the significant contact actuating means comprises at least one member which is moved in a circular arc by a rotating member or a plurality of members which collectively transpose a motion of a first type to a second motion of another type; as for example, a reciprocating motion is converted to a rotary motion, etc.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 114, for automatic telephone type switches with rotary selector motion.
- 130, for plural contact switches with movable contacts on a circular card or comb structure.

SEE OR SEARCH CLASS:

- 74, Machine Element or Mechanism, appropriate subclasses for various compound mechanical movements.
- 200, Electricity: Circuit Makers and Breakers, subclass 4 for multiple circuit control switches utilizing combined pivoted and reciprocating contacts and subclasses 175+ for automatic multiple contact selective switches utilizing combined or compound motions.

- 123** This subclass is indented under subclass 122. Subject matter wherein the contact actuating means comprises significant structural details of a pawl and ratchet device.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 140, for switches of the step-by-step type utilizing pawl and ratchet mechanism.

SEE OR SEARCH CLASS:

- 74, Machine Element or Mechanism, subclass 575 for pawl and ratchet devices of general utility.

- 124** This subclass is indented under subclass 121. Subject matter wherein the contact actuating structure is combined with armature structure which within itself comprises significant means whereby the actuating means is controlled.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 187, below for significant contact actuating means not specifically utilized in any special type switch and combined with an armature.

- 125** This subclass is indented under subclass 124. Subject matter wherein the armature structure comprises an armature pivoted or otherwise supported at a point in such a manner as to be alternately attracted by different poles of a magnet structure for producing motion in a rotary or oscillatory manner whereby the contacts are caused to be selectively opened or closed.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 72, for plural contacts actuated by rotary electric motor.
- 181, for plural magnets actuating a single pivoted armature.
- 272, for rotary disc or cylinder armatures.
- 276, for pivoted armature structure for electromagnets.

- 126** This subclass is indented under subclass 121. Subject matter wherein the contact actuating means consists of a device which is linearly slidable or reciprocable in alternate reverse directions along a single fixed axis or in a single plane, e.g., sliding bar or comb.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 112, for automatic telephone type switches of the cross bar type.
- 115, for automatic telephone type switches with reciprocating sliding motion.

- 129, for multiple contact switches with movable contacts on slidable card, bar or comb.
- SEE OR SEARCH CLASS:
- 178, Telegraphy, subclass 86 for telegraph code transmitter with reciprocating contacts.
- 200, Electricity: Circuit Makers and Breakers, subclass 4 for combined pivoting and reciprocating contact switches and subclass 16 for multiple circuit switch structures with reciprocating contact.
- 127** This subclass is indented under subclass 106. Subject matter wherein the structure includes at least one group of contacts adapted to operate as a unit, and means whereby all of the contacts of at least one group are actuated in a manner such that all of the plurality of external circuits connected to the contacts of the group are completed or opened simultaneously.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 8+, for automatic circuit interrupting multipole or polyphase switches.
- 88, above, for cyclic or periodical switches with plural contacts which may or may not be operated simultaneously.
- 128** This subclass is indented under subclass 127. Subject matter wherein the structure includes at least one armature; rockable about an axis coinciding with the coil axis or otherwise pivoted for rotation about a fixed axis and combined with means, depending upon the attraction or nonattraction of the armature, whereby at least a group of the plurality of contacts are actuated as a group.
- 129** This subclass is indented under subclass 128. Subject matter wherein the structure includes at least one slidable card, bar or comb means actuable by the armature and adapted to embrace a plurality of movable contacts simultaneously.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 115, for automatic telephone type multiple contact switches with sliding selector motion.
- 126, for selective multiple contact switches with linear sliding contact actuation means.
- 130** This subclass is indented under subclass 128. Subject matter wherein the structure includes at least one circular plate, comb or other means whereby either first plurality of contacts, a second such plurality, or both are caused to be moved in a circular path having a common axis.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 114, for automatic telephone switches with rotary selector motion.
- 122, for selective multiple contact switches with rotary motion contact actuator.
- 131** This subclass is indented under subclass 127. Subject matter wherein the structure includes a sliding core armature reciprocal in a linear manner, along the axis of, or in a plane parallel with the axis of the controlling magnet coil. The contact actuating means may be directly attached to the core armature or may be otherwise attached by mechanical structure which is actuable by the motion of the armature.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 14, for automatic circuit interrupting devices which have a movable contact, or contacts, directly operable by a sliding core armature.
- 251, for alternating current magnets or electromagnets with plunger type armature.
- 255+, for magnets or electromagnets with plunger type armatures.
- 132** This subclass is indented under subclass 106. Subject matter wherein the structure includes at least one structural unit which is specifically described as adapted to be adjusted, interchangeable, removable or replaceable without effecting the operativeness of the device as a

whole or whereby some operative characteristic of the device may be varied.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 42, and 45, for automatic circuit interrupting devices with adjustable trip structure.
- 67, for retarded or delayed action type switches with adjustable delay means.
- 86, for adjustable polarized switches.
- 96, and 98, respectively, for armature or contact adjusting means in vibrator type switches.
- 176, for magnetically actuated tripping means not specifically claimed in an automatic circuit interrupter.
- 197+, for adjustable contact structure.
- 212, 237, 258, 287, 295, and 298, respectively for magnets or electromagnets with various adjustable features.

- 133** This subclass is indented under subclass 106. Subject matter wherein the structure includes significant details of the contact arrangement or structure; for example, a matrix or cross bar arrangement, which particularly adapts the contact assembly to operate in a predetermined manner or sequence.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 15+, for automatic circuit interrupters with contact biasing, holding or pressure control means.
- 57+, for contact or electrode structure for conductive liquid type switches.
- 83, for polarity responsive switch contact structure or composition.
- 97+, for periodic switch contact arrangement or composition.
- 196+, for significant contact composition or structure not specifically adapted for use in any particular special type switch.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclasses 166+ for significant contact details.
- 340, Communications: Electrical, subclasses 14.1 through 14.69 for decoder matrix-type crossed gratings

with selectively energized conductors and

- 361, Electricity: Electrical Systems and Devices, subclass 822 for wire bank assemblies.

- 134** This subclass is indented under subclass 133. Subject matter wherein the contacts are arranged in coordinate rows in planes which are at an angle to each other (usually a right angle) or in a grid arrangement, whereby contact is made by displacing one contact perpendicularly to another. The switches found here are for the most part those known as crossbar or coordinate types, similar to those found in Class 379, subclass 25, but not limited by the claim language to use in a telephone system.

SEE OR SEARCH CLASS:

- 340, Communications: Electrical, subclasses 2.2 through 2.31 for a channel selecting matrix and subclasses 14.1-14.69 for decoder matrix-type contact arrangements in selective signalling systems.

- 135** This subclass is indented under subclass 133. Subject matter wherein the contacts are specifically arranged in a pile or stack.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclasses 166+ for miscellaneous contact structure.

- 136** This subclass is indented under subclass 106. Subject matter wherein the structure includes a plurality of magnet or coil means.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 8+, for automatic circuit interrupters for the polyphase or multipole type having plural electromagnets.
- 92, for periodic switches with plural magnets.
- 102, for alternating current switches of the polyphase type.
- 103, for alternating current switches with plural magnetic actuators.
- 149, for electrodynamically operated switches of the moving coil type with plural coils.

- 177+, for electromagnetically controlled switches in general utilizing plural magnets or other flux sources.
- 207, for permanent magnet actuated switches with plural magnets.
- 223+, for magnetomechanical motive devices of the relatively moving conductor type.
- 246, for alternating current magnetomotive device with plural windings.
- 266+, for electromagnet structure comprising plural coils or magnets.
- 137** This subclass is indented under subclass 136. Subject matter wherein the plural magnets are of diverse magnetic characteristics, as for example, electromagnet and permanent magnet or comprise diverse type windings.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 159+, for plural independent switches each of which may utilize one or more windings.
- 179, for magnetic switches in general utilizing plural diverse type magnets.
- 229+, for magnetomotive devices having permanent magnet and electromagnet structure.
- 138** This subclass is indented under subclass 2. Subject matter wherein the device comprises means whereby plural successive energizations of a control magnet by pulses of control signal current produce a sequential or step-by-step operation of a contact actuation means whereby a single set of main contacts are opened or closed at the end of the sequence of pulsations sequence of actuating pulses may comprise any number of pulses from two or more.
- (1) Note. The subject matter to be found in this and the indented subclasses should be distinguished from that classified in subclasses 107+, above, wherein a plurality of contacts are actuated in sequence in such a manner as to complete a plurality of circuits sequentially through the devices. While the contact actuating means in the above group may be similar to those found here the fundamental distinction between the two groups is that in the subclasses 107+ group there are a plurality of circuits controlled while in this group only a single set of main contacts is utilized.
- 139** This subclass is indented under subclass 138. Subject matter wherein the structure includes means whereby the successive steps take place at definite intervals, after a predetermined time or in a given order or whereby it is possible to determine the interval during which the contacts are held in the make or break condition after arrival in that condition.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 30, for automatic circuit interrupters with mechanical motor controlled (e.g., clock movement) latch or trip setting delay means.
- 64+, for retarded or delayed type switches wherein the contact actuation takes place after a predetermined interval governed by a motor or clock work mechanism.
- SEE OR SEARCH CLASS:
- 200, Electricity: Circuit Makers and Breakers, subclass 410 for rotating contact type snap switches operating in a step-by-step manner whereby the movable contact member is rotated by a series of pulses.
- 236, Automatic Temperature and Humidity Regulation, subclass 76 for control and regulating systems utilizing step-by-step actuation of an electric motor.
- 307, Electrical Transmission or Interconnection Systems, subclass 141 for switch actuation means with time delay which may employ step-by-step switch actuation means.
- 140** This subclass is indented under subclass 138. Subject matter wherein the structure includes ratchet and pawl type mechanical operating means under the control of an armature or armatures whereby the contacts are actuated to and from a closed condition in a step-by-step manner.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 123, for devices in which a plurality of sets of contacts are actuated selectively or

sequentially operated by ratchet and pawl means.

SEE OR SEARCH CLASS:

- 74, Machine Element or Mechanism, appropriate subclasses, particularly subclasses 575+, for specific machine elements and mechanisms of the pawl and ratchet type.
- 200, Electricity: Circuit Makers and Breakers, subclass 61.69 for a circuit maker or breaker whose cycle of operation corresponds to more than one opening and closing of a closure means.
- 340, Communications: Electrical, subclasses 825.65+ for remote controlled signalling devices with pulse counting means, subclasses 309.1+ for systems which are timer controlled.
- 361, Electricity: Electrical Systems and Devices, subclasses 160+ for electric circuits for relays or electromagnets utilizing a time delayed operating switch.

- 141** This subclass is indented under subclass 2. Subject matter wherein the subject matter includes the combination of magnetic responsive control means combined with terminal-current responsive means, such as fuses, cut-outs, latching or other means effecting the operation of the device as a result of heating by current flow. Usually, both diversely responsive devices operate upon the same contact actuation or control means. The heating current may comprise the entire current flowing in the controlled circuit or a proportionate part thereof flowing in a shunt circuit.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 31, for thermal controlled latch or trip delay means in automatic circuit interrupters.
- 35+, for automatic circuit interrupting devices with combined magnetic and thermal current trip means.
- 39+, for automatic circuit interrupter with magnetic latch or trip including thermal delay means.
- 43+, for automatic circuit interrupters with thermally actuated latch or trip means.

- 66, for retarded or delayed type switches with thermal delay means.
- 156, for switches with protective means responsive to heat.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclass 3 for multiple circuit control devices with thermal current control means.
- 219, Electric Heating, subclass 110 for resistance heating systems with current supply responsive to current voltage or temperature and subclasses 510+ for heating systems including automatically controlled switches with thermally responsive means.
- 236, Automatic Temperature and Humidity Regulation, subclass 68 for systems with relay structure combined with auxiliary heater means.
- 307, Electrical Transmission or Interconnection Systems, subclass 117 for switching systems responsive to heat.
- 318, Electricity: Motive Power Systems, subclasses 471+ for electric motor systems including automatic control switches with thermal control means for the switch.
- 337, Electricity: Electrothermally or Thermally Actuated Switches, subclass 14 for nonmagnetically actuated switches which are responsive to heat generated by the current in a protected circuit and subclass 298 for switches which are responsive to heat from an external source.
- 361, Electricity: Electrical Systems and Devices, subclass 99 for safety and protective systems including combined thermal-electromagnetic relays in a time delay means, and subclasses 160+ for electric circuits for relays and electromagnets with thermal control means.

- 142** This subclass is indented under subclass 141. Subject matter wherein the thermal current responsive means is specifically recited as consisting of at least one fusible element.

SEE OR SEARCH CLASS:

- 337, Electricity: Electrothermally or Thermally Actuated Switches, subclass 142 for fusible element actuated electrothermally controlled switches and 401+ for thermal switches employing fusible, combustible or explosive means.
- 361, Electricity: Electrical Systems and Devices, subclasses 1+ for thermally actuated safety and protective devices, especially subclasses 23+ and 103+.

143 This subclass is indented under subclass 141. Subject matter wherein the structure includes significant details of both the magnetic and thermal devices, and in which each is operative to close or interrupt an electrical circuit independently of the other.

144 This subclass is indented under subclass 141. Subject matter wherein the structure includes means whereby the physical position of the armature relative to magnetic pole pieces or within an air gap at any given time is responsive to or depends upon the influence of the thermal means.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 96, for periodic switches with armature adjustment.
- 217+, for electromagnet and armature of the temperature responsive type which include means for adjusting the armature by thermally responsive means.

SEE OR SEARCH CLASS:

- 315, Electric Lamp and Discharge Devices: Systems, subclass 104 for systems comprising means for supplying delayed discharge potential to the cathode circuit of discharge devices and including thermostatic delay means.

145 This subclass is indented under subclass 141. Subject matter wherein the thermal current responsive means is specifically recited as consisting of at least one bimetallic element.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 43+, for thermal trip structure with a circuit breaker environment and utilizing a bimetallic element.

SEE OR SEARCH CLASS:

- 219, Electric Heating, subclass 514 for electric heaters including automatic circuit opening or closing means comprising thermally responsive means.
- 236, Automatic Temperature and Humidity Regulation, subclass 96 and especially subclasses 101+ for thermostatic control systems including expanding solids.
- 337, Electricity: Electrothermally or Thermally Actuated Switches, subclasses 333+ for thermally controlled switches employing bimetallic elements.
- 374, Thermal Measuring and Testing, subclasses 205+ for expanding solid bimetallic temperature sensing elements.

146 This subclass is indented under subclass 141. Subject matter wherein the electrothermal current responsive actuating means consists of a material whose magnetic characteristics vary with temperature. The magnetic means and thermal current responsive means may be one and the same or may be separate means.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 208, for permanent magnet actuated switches of the thermomagnetic type.
- 217, for magnets or electromagnets of the temperature responsive type.
- 296+, for significant magnetic structure which may be thermomagnetic.

SEE OR SEARCH CLASS:

- 252, Compositions, subclass 62.5 for special magnetic compositions.
- 310, Electrical Generator or Motor Structure, subclass 306 for thermal or pyromagnetic motor or generator structure.

- 147** This subclass is indented under subclass 2. Devices in which the subject matter includes contact actuating means utilizing the force of repulsion between two circuits when a current is supplied to one and thereby induces a current in the other causing a deflection dependent upon the interaction of magnetic fields produced by the currents, means comprising plural magnets whose effect, upon energization of one by an electric current is a repulsion effect or devices in which an electrodynamic force which is the effect of currents flowing in opposite directions in two or more branches of a current carrying conductor is utilized for the opening or closing of at least one pair of contacts.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 16, for automatic circuit breaking devices utilizing the force of attraction or repulsion between electrical conductors for the purpose of assisting the opening or closing of the main contacts.
- 78+, for polarity responsive switch devices which may utilize magnetic repulsion forces in part.
- 100, for alternating current operated switches utilizing induction or eddy currents.
- 195, for switches in which the main contact pressure is controlled by magnetic or electrodynamic force.
- 223+, for electrodynamically operated magnetomotive devices.

SEE OR SEARCH CLASS:

- 124, Mechanical Guns and Projectors, subclass 3 for devices whereby a projectile is propelled by electromagnetic impulses applied thereto during the progress through a barrel.
- 200, Electricity: Circuit Makers and Breakers, subclass 147, for devices in which a coil is arranged adjacent the contacts which generates a magnetic field when a circuit is broken, which field repels and breaks the arc.
- 310, Electrical Generator or Motor Structure, subclasses 10+ for dynamoelectric devices utilizing the repulsive forces between electrical conductors.

- 318, Electricity: Motive Power Systems, subclasses 725+ for repulsion motors and subclasses 727+ for induction motors.
- 324, Electricity: Measuring and Testing, subclass 74 for the calibration of watt hour meters using induction repulsion and subclasses 137+ for measuring devices utilizing eddy currents.
- 336, Inductor Devices, subclasses 75+ for closed coil movable with respect to another coil, subclasses 115+ for various inductor devices with relatively movable coils and subclasses 130+ for relatively movable core and coil.
- 361, Electricity: Electrical Systems and Devices subclasses 1+ for safety and protective systems which may include electrodynamically actuated means.

- 148** This subclass is indented under subclass 147. Subject matter wherein the device includes structure by which the mechanical forces necessary to actuate the movable contact, or contacts, are developed by the interaction of the field set up in a moving coil or closed conductive loop and the polarizing field surrounding it. The fixed magnet is usually of the permanent type but may be an electromagnet.

- (1) Note. The moving coil devices to be found here operate either on the D'Arsonval or dynamometer principle and the search to be complete should include Class 324, subclasses 76.11+, especially indented subclasses 144+.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 222, for relatively movable coil and permanent magnet.
- 224+, below, for induced current relatively movable coil devices.

SEE OR SEARCH CLASS:

- 318, Electricity: Motive Power Systems, subclasses 654+, for position servo-mechanisms utilizing synchro transformer networks, subclass 661, for similar systems using synchro resolvers, and subclass 692, for self-synchronous motor controls utilizing "Selsyn" type transmitter-motor systems.

- 323, Electricity: Power Supply, or Regulation Systems, subclass 255 and 340 for impedance systems utilizing reactor devices with relatively movable windings.
- 336, Inductor Devices, subclasses 75+ and 115+ for inductor devices with relatively movable coils.
- 340, Communications: Electrical, subclasses 870.31+ for telemetering systems employing inductive transmitters.
- 149** This subclass is indented under subclass 148. Subject matter wherein the moving coil conductor structure includes at least two such coils and in which the relative motion of the circuit controlling contacts depends upon the position of the coils relative to each other or the relative motion of the coils within a flux field.
- SEE OR SEARCH CLASS:
- 336, Inductor Devices, subclasses 115+ for inductor devices having a plurality of relatively movable coils.
- 150** This subclass is indented under subclass 148. Subject matter wherein the structure includes means whereby the contacts may be restored to an unactuated condition by returning the contact arm to the zero or neutral setting of the device.
- SEE OR SEARCH CLASS:
- 324, Electricity: Measuring and Testing, subclasses 154+ for measuring devices utilizing inductive rotor means with zero reset.
- 151** This subclass is indented under subclass 2. Subject matter and wherein at least the contacts, of an electromagnetic switch operate in at least a partial vacuum or wherein the contacts are housed in a space hermetically sealed and containing a significant gas. The switches found here are for the most part those commonly referred to as "reed switches".
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 47+, for conductive liquid switches wherein the contacting members may be in a sealed enclosure.
- 93+, for vibratory switches with reed type contacts which may or may not be tuned to a particular frequency.
- 235, for polarized electromagnet with vibrating reed or spring bar type armature.
- 292, for lifting or attracting type electromagnet of the hermetically sealed type.
- SEE OR SEARCH CLASS:
- 178, Telegraphy, subclasses 47+ for vibrating reed type telegraphy apparatus.
- 200, Electricity: Circuit Makers and Breakers, subclass 152 for liquid contact switches in sealed containers.
- 152** This subclass is indented under subclass 151. Subject matter wherein the structure includes at least two or more separate and distinct devices under the subclass 151 definition. The devices are usually mounted in a group or cluster all being under the influence of a single magnetic flux source and may act cooperatively or individually.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 11, for structure of plural switches of the automatic circuit interrupting type.
- 88+, for plural switches of the periodic or vibrator type.
- 159+, for subject matter comprehending plural independently operative switches where the switches are disclosed as vacuum switches but in which no significant details of the switches are claimed except in name only.
- 206, for plural switches of the permanent magnet actuated type.
- SEE OR SEARCH CLASS:
- 340, Communications: Electrical, subclasses 2.2 through 2.31 for a channel selecting matrix and subclasses 14.1-14.69 for decoder matrix-type selective signalling systems utilizing reed switches.
- 153** This subclass is indented under subclass 151. Subject matter wherein the structure includes at least one permanent magnet means.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 84+, for polarity responsive devices with significant magnetic structure.
- 91+, for vibratory type with significant magnet structure.
- 177+, for switch devices utilizing plural magnets.
- 230+, for electromagnets utilizing permanent magnets.
- 302, for significant permanent magnet structure, per se, applicable to switches or relays.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclasses 61.62+ for closure actuated devices which may utilize reed switches with particular magnet means.

- 154** This subclass is indented under subclass 151. Subject matter wherein the structure includes specific mechanical details of armature, contact actuating or contact structure which is significantly peculiar to reed or other sealed switches.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 80+, for polarity responsive switches with significant armature structure.
- 83, for polarity responsive switches with significant contact structure.
- 93+, 95+ and 97+, respectively for vibrator type switches with significant contact actuating armature or contact means.
- 185+, for significant contact actuating means not peculiar to any specific type switch.
- 196+, for significant contact composition or structure.

SEE OR SEARCH CLASS:

- 29, Metal Working, subclasses 874+ for processes of manufacture of electrical contacts and terminals.
- 65, Glass Manufacturing, subclasses 42+ for processes for the assembly of reed switch contacts with an envelope.

- 200, Electricity: Circuit Makers and Breakers, subclass 144 for vacuum switches with arc prevention and subclasses 166+ for contact details.

- 310, Electrical Generator or Motor Structure, subclass 25 for reciprocating motors of the vibrating reed type.

- 155** This subclass is indented under subclass 2. Subject matter wherein the structure includes means whereby the contact opening or closing operation takes place only at a predetermined voltage or upon the passage of an operating current, of a predetermined value or range of values between predetermined limits, through the control coil or coils of the device.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 18+, for automatic circuit interrupters responsive to predetermined current direction condition or value.
- 20, for automatic circuit interrupters which are voltage responsive.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclass 56 for switches combined with indicating instruments.
- 307, Electrical Transmission or Interconnection Systems, subclasses 125+ for miscellaneous switching systems which may be responsive to various electrical conditions.
- 337, Electricity: Electrothermally or Thermally Actuated Switches, subclasses 14+ for thermal current responsive switches.
- 361, Electricity: Electrical Systems and Devices, subclasses 1+ for automatic safety and protection systems, and subclasses 170+ for relay and electromagnetic switching circuits responsive to various conditions, including voltage or current.

- 156** This subclass is indented under subclass 2. Subject matter wherein the structure includes at least one means whereby the device is protected from physical or electrical damage; such as, burnout, contact burning or pitting, physical breakage or damage due to jar, overheating, etc.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 157+, for switches with locking or holding structure to prevent or inhibit unwanted operation of the contacts from a first condition to a second condition.
- 193, for significant contact activating means with means for preventing vibration bounce or chatter.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclasses 166+ for non-magnetic switches with protective means.
- 307, Electrical Transmission or Interconnection Systems, subclasses 134+ for electrical switching systems with operation facilitating or self-protective features.

- 157** This subclass is indented under subclass 2. Subject matter wherein the structure includes positive locking or holding means whereby the main contacts are inhibited or restrained from movement by external sources of influence; for instance against shock or accidental motion. The locking devices to be found here generally comprise either mechanical or magnet devices which are either manually or automatically operated independently of any latching means which may be present; for example, holding coil means.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 21+, for automatic circuit breakers with latching means.
- 77, for motor actuated switches with lock, latch or trip.
- 113, for multiple contact automatic telephone switches with holding, locking or latching means.
- 167+, especially 168, for latching means with unwanted contact actuation means.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclasses 6+ for pivoted contact switches with holding coil means and subclasses 44+ for

switches with unauthorized use prevention devices comprising locks.

- 307, Electrical Transmission or Interconnection Systems, subclass 142 for switch actuating means with locking, holding or breaking means.
- 361, Electricity: Electrical Systems and Devices, subclass 194 for electric circuits for relays and electromagnets and including holding means.

- 158** This subclass is indented under subclass 157. Subject matter wherein the structure includes significant means whereby the contacts are retained in an open or unoperated condition.

- 159** This subclass is indented under subclass 2. Subject matter wherein the structure comprises all of the essential elements (as defined in the definition of subclass 2 above, and not merely by name only) of two or more separate and distinct switch devices, which may or may not employ common electromagnetic operating means; and which if detached or removed from each of the other devices, is capable of opening or closing an electrical circuit by means within the device.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 11, for plural automatic circuit breakers.
- 52, for plural vacuum or hermetically sealed switches.
- 88+, for plural periodic switches.
- 206, for plural switches of the permanent magnet actuated type.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclass 5 for multiple circuit control means comprising multiple switches.
- 307, Electrical Transmission or Interconnection Systems, with plural supply circuits or sources and having a switch in each supply source, and subclass 113 for switching systems comprising plural switches.
- 361, Electricity: Electrical Systems and Devices, subclasses 1+ for safety and protective systems involving three wire lines with switch in each line and subclasses 139+ for electric circuits for plural relays or electromagnets.

160 This subclass is indented under subclass 159. Subject matter wherein the structure includes means whereby the plural devices are caused to operate alternately, successively or selectively, depending upon conditions either in the circuits which are to be controlled, at the will of an operator, or according to a predetermined cycle or schedule. This subclass also contains those patents relating to means whereby one device is prevented from operating while another is in operating position as by an interlocking device.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 120, for multiple contact switches with plural armatures with interlocking or mechanical connection.
- 233, for polarized electromagnet with plural armatures having armature locking means.

SEE OR SEARCH CLASS:

- 74, Machine Element or Mechanism, subclass 483 for interlocking linkage systems.
- 200, Electricity: Circuit Makers and Breakers, subclass 1 for multiple circuit control devices, particularly indented subclass 5 for plural switches which may be interlocked, indented subclass 18 for plural switch operating means mechanically connected, and subclass 50 for plural interlocked switches.
- 235, Registers, subclass 431 for data comparing calculators including plural coordinated switches.
- 246, Railway Switches and Signals, subclasses 131+ for interlocking signaling systems with electric switch actuating means.
- 361, Electricity: Electrical Systems and Devices, subclasses 191+ for electric circuits for relays and electromagnets comprising interlocking means.

161 This subclass is indented under subclass 160. Subject matter wherein the structure includes significant actuating means which acts cooperatively or through the interlocking means to control the operation of at least two separate circuit controlling devices.

162 This subclass is indented under subclass 159. Subject matter wherein the structure includes means whereby at least one or more separate devices are housed or supported in common as a unit or whereby each shares a common magnetic flux path. The common flux path may be excited by a plurality of windings or other flux sources. The common support means may consist of a base only.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 202, for significant housing or support structure not restricted to use with any particular type of switch set out above in the schedule.
- 292, for lifting or attracting type electromagnet of the hermetically sealed type.
- 294, for lifting or attracting type electromagnets with outer casing or housing.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclass 168 for significant details of casing and bases for non-magnetically actuated switches in general.
- 361, Electricity: Electrical Systems and Devices, subclasses 600+ for distribution boards and analogous devices such as switch boards and housings.

163 This subclass is indented under subclass 159. Subject matter wherein the structure includes significant means whereby the plurality of devices are actuated through the medium of a unitary or common magnetic flux source.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 152, for plural vacuum or reed switches which may share a common flux source.
- 180+, for switches comprising plural windings utilizing a common magnetic core.
- 265, for magnetomotive devices comprising plural armatures actuated by a single electromagnetic coil.

- 164** This subclass is indented under subclass 2. Subject matter wherein the subject matter relates to structure comprising a manual or gravity operated latching means combined with at least one electromagnetically operated trip means whereby the latch means is forcibly tripped upon the operation of the electromagnet.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 21+, above, for automatic circuit interrupting devices with latching or tripping means, especially indented subclass 27 for automatic combined with manual resetting or reclosing means.

SEE OR SEARCH CLASS:

- 74, Machine Element or Mechanism, subclasses 2+ for automatic trip or mechanical latch mechanisms in general.
200, Electricity: Circuit Makers and Breakers, subclass 169 for significant latch structure for nonelectromagnetically actuated switches.

- 165** This subclass is indented under subclass 2. Subject matter wherein the structure includes actuating means for at least one set of contacts whose operation to open or closed position is directly dependent upon the operation or position of a latching or tripping device and in which the latching or tripping device utilizes mechanical structural elements in common with a toggle or other contact actuating means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 187, for contacting actuating means unitary with armature.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclasses 39+ for clock train retarded switches with latch trip, subclasses 70+ and 78 for snap action switches with latch trip, subclass 318 for mechanical switches comprising combined latch or trip means with contact operating means and subclass 169 for latch trip for switches in general.

- 361, Electricity: Electrical Systems and Devices, subclasses 1+ for miscellaneous circuit breaker systems, comprising latch or trip structure.

- 166** This subclass is indented under subclass 2. Subject matter wherein the structure includes means whereby either the latch or the latch tripping device may be reset to its operative condition after having completed the transition to an unoperative condition.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 26+, for automatic circuit interrupting devices with resetting or reclosing means.
150, for moving coil type switch operators with reset or restoring means.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclass 169 for nonmagnetically operated switch devices with specific latch details.
361, Electricity: Electrical Systems and Devices, subclasses 71+ for safety protection devices with subsequent automatic restoration means and subclass 93.4 for abnormal current condition protection including automatic circuit reset after interruption of electric system.

- 167** This subclass is indented under subclass 2. Subject matter wherein the structure includes specific details of operating means whereby at least one set of contacts may be restrained in one of two normal conditions (open or closed). The latching means usually consists of structure adapted for mechanically maintaining a contact actuating means, such as a toggle arrangement, armature or other carrier, in a given position independently of the magnetic control means so that once the contacts are closed, or opened, the magnetizing current may be cut off and the contacts remain in their opened or closed condition until a tripping action takes place.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 21+, for automatic circuit interrupting devices with latch or trip means.

- 77, for motor actuated switches with latch or trip means.
- 113, for automatic telephone type multiple contact switches with latching means.
- 164, for manual or gravity operated latch with electromagnetic trip.
- 165, for contact actuating means unitary with latch or trip.
- 166, for switches with latch or trip reset means.
- 253+, for electromagnet and armature with armature latch means.

SEE OR SEARCH CLASS:

- 74, Machine Element or Mechanism, subclasses 2+ for automatic latch or trip mechanisms and subclasses 527+ for mechanical latching or detent devices in general.
- 200, Electricity: Circuit Makers and Breakers, subclass 83 for fluid pressure switches of the diaphragm type with latching means and subclass 169 for latch details.
- 361, Electricity: Electrical Systems and Devices, subclasses 139+ for electric circuits for relays and electromagnets with latch mechanisms.

- 168** This subclass is indented under subclass 167. Subject matter wherein the structure includes means whereby the latching mechanism is positively locked or prevented from actuation from a first condition to a second condition while the locking means is operative.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 34, for automatic circuit interrupter with lockout.
- 77, for motor actuated switch with locking means.
- 113, for multiple contact automatic telephone type switches with holding or locking means.
- 157, for significant locking structure peculiarly adapted for preventing the operation of the main contacts inadvertently by external means.
- 233, for polarized electromagnet and plural armatures with locking means.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclasses 44+ for switches with locking means to prevent unauthorized use.
- 307, Electrical Transmission or Interconnection Systems, subclass 142 for electromagnetic switch actuators with locking, holding or braking means.
- 361, Electricity: Electrical Systems and Devices, subclasses 78+ for safety and protective devices with voltage responsive restraining means.

- 169** This subclass is indented under subclass 167. Subject matter wherein the latch structure comprises at least two separate cooperative latching devices each under the influence of a separate actuating means. One of the latching devices may constitute the principle latch while at least one other constitutes an auxiliary latch whose function is to restrain the principle latch.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 22+, for automatic circuit interrupting devices which include plural latch means or plural operating means for a single latch.

- 170** This subclass is indented under subclass 167. Subject matter wherein the latching structure includes independent magnetic means; such as a holding coil and armature, for instance, whereby the latch is operated into, or held in holding relationship with contact actuating means. Also included in this subclass are devices where no mechanical latch is used and which depend entirely upon magnetic means for directly holding the contact arm or arms in closed position.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 21+, especially subclasses 38+ for automatic circuit interrupting devices including magnetically controlled latching means.
- 254, for electromagnet and armature with armature latch control winding.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclass 169 for magnetically controlled latches in general.
- 290, Prime-Mover Dynamo Plants, subclasses 7+, especially subclasses 37 and 38, for electric control apparatus for electric engine starting motors which may include electromagnetic switches with magnetic latching means.
- 337, Electricity: Electrothermally or Thermally Actuated Switches, subclass 71 for electrothermally actuated switches with plural latch or latch release means one of which may be magnetic.
- 361, Electricity: Electrical Systems and Devices, subclasses 67+ for safety and protection devices which may include magnetic latching means.

- 171** This subclass is indented under subclass 167. Subject matter wherein the latching structure includes spring or other energy storing means whereby the latch is biased to either operative or inoperative condition.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 15+, for automatic circuit interrupting devices including contact biasing means which may be a component of the latching means.
- 192, for contact actuating structure with biasing means to either the open or closed position.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclass 170 for significant contact pressure adjustment means which may comprise spring means.

- 172** This subclass is indented under subclass 2. Subject matter wherein the structure includes significant details of at least one means whereby a latch is released or tripped from a first operative condition to a second nonoperative condition.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 21+, for automatic circuit interrupting devices with significant trip structure.
- 77, for motor actuated switches with trip structure.
- 165, for unitary contact actuating and latch or trip means.
- 166, for switch with latch or trip reset means.

SEE OR SEARCH CLASS:

- 74, Machine Element or Mechanism, subclasses 2+ for mechanical trip structure, per se.
- 200, Electricity: Circuit Makers and Breakers, subclasses 39+ for retarded switch structure including trip means, subclasses 411+; 415+ for double snap switches with trip means, subclass 470; 471 for single snap switches with trip means, and subclasses 424+ for reciprocating snap switches with trip means.
- 337, Electricity: Electrothermally or Thermally Actuated Switches, subclasses 47+, 70+, 128+, 150+, and 174+ for electrothermally actuated switches which include trip releases and subclasses 356+ and 411 for thermally actuated switches including trip releases.
- 361, Electricity: Electrical Systems and Devices, subclasses 115+ for specific circuit breaker or relay structure which may include tripping means.

- 173** This subclass is indented under subclass 172. Subject matter wherein the tripping structure includes significant details of at least two or more separate and distinct tripping means of diverse type; as for example, manual and magnetic, each of which is operative independently of the other.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 35+, above, for automatic circuit interrupting devices with plural or combined trip structure.

174 This subclass is indented under subclass 172. Subject matter wherein the tripping means includes significant magnetic structure whereby the tripping means is actuated. The magnetic flux for operating the trip device may be derived from the main magnetic circuit or from an independent magnetic source.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 38+, for automatic circuit interrupting devices with significant magnetic trip structure.
- 164, for manually or gravity operated latch with electromagnetic trip.

SEE OR SEARCH CLASS:

- 361, Electricity: Electrical Systems and Devices, subclass 102 for safety and protective devices, comprising breakers operative by the removal of tripping coil shunt means.

175 This subclass is indented under subclass 174. Subject matter wherein the magnetic trip actuating structure includes impact means whereby the latch is tripped by the delivery of a sharp hammer blow to some part thereof. The impact means usually consists of a reciprocating member (armature) actuated by a coil but may be an inertia means released by action of an armature.

176 This subclass is indented under subclass 174. Subject matter wherein the claimed trip structure includes adjusting or regulating means whereby some operative characteristic of the tripping device, such as the current value required for actuation, may be predetermined or automatically adjusted or regulated.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 42, above, for automatic circuit interrupting devices with adjustable or regulatable magnetic tripping means, subclass 45 for similar thermal tripping means with regulating means and subclasses 258 and 273 for electromagnets and armatures with adjusting means.

177 This subclass is indented under subclass 2. Subject matter wherein the structure includes at least two or more magnetic flux sources adapted to cooperate in the operation of the same main circuit control contacts. Generally one magnet operates to close the circuit and the other operates to open the circuit or several magnets may operate simultaneously on an armature system. One or more of the magnets may be a permanent magnet.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 8+, for multipole or polyphase circuit interrupting devices with plural flux sources.
- 11, for plural automatic circuit interrupters each with magnet.
- 92, for periodic type switches with plural magnets.
- 102, and 103, for alternating current actuated switches with plural magnets.
- 136, for multiple contact type with plural magnet or coil means.
- 159+, for plural independently operated switches.
- 206, for plural switches of the permanent magnet operated type.
- 207, for switches utilizing plural permanent magnets.
- 223+, for magnetomotive device of the relatively movable conductor type (e.g., dynamometer type).
- 246, for alternating current electromagnets with plural windings.
- 266+, for other electromagnets with plural coils.

SEE OR SEARCH CLASS:

- 178, Telegraphy, subclasses 74+ for telegraph circuits with electromagnetic switching means utilizing plural magnets.
- 246, Railway Switches and Signals, subclasses 218+ (especially subclasses 227 and 231+) for electrically actuated railway signal devices utilizing plural magnets.
- 361, Electricity: Electrical Systems and Devices, subclasses 160+ for electric circuits for relays and electromagnets with plural coils.

- 178** This subclass is indented under subclass 177. Subject matter wherein the magnets are specifically described as having diverse electrical characteristics, for example one may be voltage responsive while another is current responsive. Also included here are systems in which one magnet winding is described as in series with a source of current while another is shunt connected.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 137, above, for multiple contact type switching devices utilizing plural diverse type magnets or flux sources of diverse types.

- 179** This subclass is indented under subclass 177. Subject matter wherein the magnets are specifically described as having diverse magnetic characteristics. For example, one or more may be a permanent magnet while another may be an electromagnet.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 78+, for polarized switches utilizing a plurality of magnetic means consisting of electromagnet plus permanent magnet.
153, for vacuum or hermetically sealed type switches with electromagnet and permanent magnet structure.
222, for magnetomotive device with relatively movable coil and permanent magnet.
229+, below, for electromagnets with armature including permanent magnet devices.

SEE OR SEARCH CLASS:

- 361, Electricity: Electrical Systems and Devices, subclass 208 for electric circuits for electromagnets and relays employing polarized relay means utilizing electromagnets plus at least one permanent magnet.

- 180** This subclass is indented under subclass 177. Subject matter wherein the structure includes a single core or armature common to at least two of the magnet means. The armature structure may comprise a single plunger reciprocally

related to a plurality of coils or may be of the hinged or pivoted type actuated by the coils in common.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 92, for periodic switches employing a common armature, usually pivoted for alternate attraction and repulsion in two directions.
163, for plural switches with common magnet flux source.
256, for plural coil actuated plunger armature.
266, for electromagnetic devices employing plural coils controlling a single armature.

- 181** This subclass is indented under subclass 180. Subject matter wherein the single armature is specifically a pivoted armature.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 68+, for rotary motor actuated switches.
125, for multiple contact switches with rotary armature.
128+, for simultaneously actuated multiple contact switch with pivoted armature.
266, for electromagnets consisting of plural coils actuating a single pivoted armature.
272, for electromagnet with rotating disk or cylindrical armature.
275, for electromagnet with armature having a hinge joint.
276, for electromagnet with armature having a pivot support.

SEE OR SEARCH CLASS:

- 178, Telegraphy, subclass 16 for telegraph systems employing plural windings and a single armature for current reversing.

- 182** This subclass is indented under subclass 180. Subject matter wherein the plurality of magnetic coils or other flux sources are wound upon a common core in such a manner or otherwise arranged so that their magnetic flux fields are opposing and whereby the armature or armatures are acted upon by a resultant flux field which may be zero or the difference between two or more fields. The devices clas-

sified here are of the type commonly known as differential type. The two or more windings are so connected that when energized together their magnetic effects neutralize each other and no effective flux is produced.

SEE OR SEARCH CLASS:

- 246, Railway Switches and Signals, subclasses 227+ for railroad signaling switches with opposed magnets and subclasses 231+ for reciprocating actuators with opposed magnets.
- 340, Communications: Electrical, subclasses 870.31+, especially subclasses 870.35+, for inductor transmitters which may employ differentially wound coils with magnetic fields opposing.
- 361, Electricity: Electrical Systems and Devices, subclasses 160+ for electric circuits for relays and electromagnets which may utilize differentially wound coils.

- 183** This subclass is indented under subclass 177. Subject matter wherein the torque generated by at least two magnetic flux sources act in opposition to each other or in opposite directions. The plurality of flux sources may be energized simultaneously or alternately whereby a contact actuating means may be operated first toward one position and then toward a second position as from open to closed and vice versa.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 266, for electromagnetic relays comprising plural coils adapted to be separately or selectively energized.

- 184** This subclass is indented under subclass 177. Subject matter wherein at least two or more magnetic coils are provided with reciprocating core armatures which operate in alignment along a common axis and which may or may not be rigidly mechanically connected.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 259, for magneto-mechanical devices utilizing plural plunger type armatures.
- 267, for magneto-mechanical devices employing both plural coils and plural armatures.

- 185** This subclass is indented under subclass 2. Subject matter wherein the significant structure comprises apparatus in addition to, but actuated by, an armature or armatures whereby at least one movable contact is caused to be actuated from a first position to a second position in relation to a fixed contact resulting in an electrical circuit being completed or broken.

- (1) Note. For devices in which the movable contact is pivotably connected upon or relatively movably attached to the armature the search is in subclass 200.
- (2) Note. When the specific contact actuating structure is shown or disclosed in a device falling in a specific type classifiable elsewhere in the class, and the claims do not recite elements of the more comprehensive structure; search must be extended to the more specific subclass.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 71+, for motor operated switches with contact actuating structure.
- 93+, for periodic switches with vibratory reed or other periodic contact actuator.
- 121+, for multiple contact switches with significant contact actuating means.
- 154, for vacuum or hermetically sealed type switches with particular contact actuating means.

- 186** This subclass is indented under subclass 185. Subject matter wherein the significant contact actuating means includes at least one manual means such as a push button or operating lever, whereby the movable contact or contacts are actuated from a first to a second position. The electromagnetic means may act to maintain the contacts closed after actuation by the manual means.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 72, for motor actuated switches with particular plural contact actuating means.
- 121+, for multiple contact type switches with significant contact actuating means.

- 140, for step-by-step type with significant multiple contact actuating means.
- 164, for switches having manual contact operating means with latch or electromagnetic trip means.
- 238, for electromagnet with armature with auxiliary armature movement control means (e.g., manual).
- 187** This subclass is indented under subclass 185. Subject matter wherein at least one significant contact actuating means is structurally combined with armature in such a manner as to form a physical entity therewith and in which both are claimed.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 165, for contact actuating means unitary with latch or trip.
- 200, for devices including significant armature structure having at least one movable contact pivoted thereon and adapted to be relatively movable thereto.
- 188** This subclass is indented under subclass 185. Subject matter wherein the significant actuating structure includes means whereby the contact motion is caused to take place abruptly and is not dependent on the rate of movement of the armature. The contact movement is usually accomplished by a spring connection between the operator and the contact in such a manner that the initial movement of the armature or other actuating means places the spring under tension until released whereupon the movable contact is snapped to open or closed position by the energy stored in the spring.
- SEE OR SEARCH CLASS:
- 74, Machine Element or Mechanism, subclass 97 and 100 for mechanical snap actions.
- 200, Electricity: Circuit Makers and Breakers, appropriate subclass 405 under "SNAP" for various snap actions for nonmagnetically operated switch devices.
- 361, Electricity: Electrical Systems and Devices, subclasses 157+ for electric circuits for relays or electromagnets which may be of the snap switch type.
- 189** This subclass is indented under subclass 185. Subject matter wherein the significant contact actuating structure comprises mechanical linkage operative between an armature and at least one movable contact whereby motion of the armature is transmitted to the movable contact.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 110+, for multiple contact automatic telephone type switches with multidirectional motion converting means.
- SEE OR SEARCH CLASS:
- 74, Machine Element or Mechanism, subclasses 469+ for mechanical linkage systems, per se.
- 200, Electricity: Circuit Makers and Breakers, subclass 17 for multiple circuit control devices with significant operating means and subclasses 502+ for miscellaneous switch actuating mechanism details.
- 307, Electrical Transmission or Interconnection Systems, subclasses 139+ for switching systems utilizing significant switch actuating means.
- 361, Electricity: Electrical Systems and Devices, subclasses 115+ for specific circuit breaker or relay structure.
- 190** This subclass is indented under subclass 189. Subject matter wherein the mechanical linkage comprises at least one cam, roller or eccentric device whereby the force applied to open or close a movable contact may be varied during the opening or closing operation, or the armature may be held in a predetermined position upon actuation.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 73, above, for motor driven switches employing eccentric or cam means.
- SEE OR SEARCH CLASS:
- 74, Machine Element or Mechanism, appropriate subclasses, especially subclass 9, 10.29+, 10.6, 53, 54, 55+, 567+, 570+, 835, and 838+ for mechanical elements including cams and/or eccentric devices.

- 200, Electricity: Circuit Makers and Breakers, subclasses 19.03+, 19.13+ and 19.20+, for periodic switches, subclass 38 for clock train retarded and subclasses 431 for snap action switches, all utilizing cams.
- 191** This subclass is indented under subclass 189. Subject matter wherein the mechanical linkage comprises structure whereby the force applied to a moving contact is the result of a motion in a first direction converted to a motion in a second direction; for example, a linear first motion may be converted to a rotary motion about a fixed origin or pivot as by a toggle linkage.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 110, for automatically controlled multiple contact automatic telephone type switching devices utilizing motion conversion means.
- 122+, for multiple contact switches with compound motion contact actuator.
- 140, for step-by-step switch with ratchet and pawl type actuator.
- SEE OR SEARCH CLASS:
- 74, Machine Element or Mechanism, subclasses 520+ for mechanical toggle elements, per se.
- 200, Electricity: Circuit Makers and Breakers.
- 192** This subclass is indented under subclass 185. Subject matter wherein the significant contact actuating structure includes spring biasing means whereby the movable contact or contacts are positively biased toward one of two positions independently of the armature means. The biasing may be toward either the open or closed position and is operative to assist an armature or other actuating means in the opening or closing operation.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 15+, for automatic circuit interrupting devices including biasing or pressure control means.
- 157+, for switches with operation inhibiting means.
- 193, for contact bounce, chatter or vibration preventing means.
- 194+, for contact pressure maintaining or adjusting means.
- SEE OR SEARCH CLASS:
- 307, Electrical Transmission or Interconnection Systems, subclass 142 for miscellaneous switches with locking, holding or breaking means.
- 361, Electricity: Electrical Systems and Devices, subclass 194 for relay systems having relays with contact holding or locking means.
- 193** This subclass is indented under subclass 185. Subject matter wherein the contact actuating structure includes means whereby the contacts are prevented from vibrating, rebounding or chattering when in the closed position or during the closing operation. The apparatus generally comprises compression means, inertia weights or other similar structure for absorbing the kinetic energy of the moving parts.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 46, for automatic circuits interrupting devices with rebound prevention means.
- 104, for alternating current actuated switches with chatter, bounce or vibration prevention means.
- 247+, for alternating current type switches with chatter or noise preventing means.
- 271, for electromagnet and armature with armature bounce or vibration preventing means.
- 194** This subclass is indented under subclass 185. Subject matter wherein the contact actuating structure includes additional means whereby a predetermined or constant pressure is applied to the contacts while in the circuit closing position or whereby such contact pressure may be adjusted.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 15+, above, for automatic circuit interrupting devices with pressure control means.
- 192, above, for devices having spring biasing means for assisting in the opening or closing of the contacts.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclass 8 for switches in which contact pressure between fixed and movable contacts is exerted in a line radial to the arc of movement of a pivoted contact and subclass 170 for contact pressure adjustment means generally.
- 361, Electricity: Electrical Systems and Devices, subclasses 157+ for electric circuits for relays and electromagnets including contact pressure increasing means.

195 This subclass is indented under subclass 194. Subject matter wherein the pressure maintaining or adjusting means comprises magnetic means or structure whereby an electrodynamic force established between two current carrying conductors is utilized to establish a pressure tending to maintain the contacts closed.

- (1) Note. For devices wherein an electrodynamic force is utilized to actuate or to assist in the opening or closing of circuit closing contacts see subclass 147.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 16, for automatic circuit interrupting devices with magnetic blowon or blowoff; i.e., magnetic biasing.

196 This subclass is indented under subclass 2. Subject matter wherein the structure includes significant details of the composition of matter or mechanical structure of the contact assembly, its support on or attachment to the magnetic device.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 57+, for liquid contact switches.
- 83, for polarity responsive switches with particular contact structure.
- 97+, for periodic switches with particular contact structure.
- 133+, for particular contact structure or arrangement in a multiple contact switch.
- 154, for vacuum switches with particular contact structure.

SEE OR SEARCH CLASS:

- 29, Metal Working, subclasses 874+ for process of manufacture of electrical contacts.
- 178, Telegraphy, subclasses 79+ for telegraph transmitters with particular contacts and subclasses 101+ for telegraph keys with significant contact means.
- 200, Electricity: Circuit Makers and Breakers, subclass 166 for contact structural details.
- 252, Compositions, subclasses 500+ for electricity conductive compositions.

197 This subclass is indented under subclass 196. Subject matter wherein the contact structure comprises significant means whereby the contact or contacts are readily detachable or adjustable relative to the magnetic structure, the armature or each contact relative to the other.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 98, above, for periodic switches with adjustable contacts.

198 This subclass is indented under subclass 197. Subject matter wherein the subject matter relates to means whereby the device may be adapted to operate as a normally open or closed contact switch.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 105, for alternating of fluctuating current type switches which are adjustable.

199 This subclass is indented under subclass 196. Subject matter wherein the contact structure, or at least a part thereof, is of the preformed surface type, which is usually formed by depositing a metallic conducting material upon an insulating surface, by etching away part of a metal coated insulating surface, or by printing on a conductive layer, etc.

SEE OR SEARCH CLASS:

- 156, Adhesive Bonding and Miscellaneous Chemical Manufacture, appropriate subclasses for making pre-

- formed circuits by surface bonding or especially subclasses 2+ for making a conductor attached to a sheet-like body for an etching operation.
- 174, Electricity: Conductors and Insulators, subclasses 250+ for other printed circuits.
- 204, Chemistry: Electrical and Wave Energy, appropriate subclasses for processes for electrochemically producing preformed articles or circuit structure, such as switches, contacts, etc.
- 361, Electricity: Electrical Systems and Devices, subclasses 748+ for structure of impedances and circuit components of the printed circuit type and subclasses 823+ for switch boards and analogous devices with printed terminals.
- 427, Coating Processes, subclasses 58+ for processes of coating, per se, wherein the product has utility as an electrical product.
- 439, Electrical Connectors, subclass 17 for preformed panels with printed circuitry which include detachable connectors.
- 200** This subclass is indented under subclass 196. Subject matter wherein the structure includes at least one movable contact device which is pivotally or otherwise attached to an armature in such a manner as to be movable relative thereto and independently thereof. The connection usually consists of a spring biased pivotal means but may comprise any lost motion connection providing for relative movement.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
189+, for significant contact actuating means comprising mechanical linkage between the armature and at least one fixed contact.
- SEE OR SEARCH CLASS:
178, Telegraphy, subclass 106 for telegraph keys with shifting contact point.
- 201** This subclass is indented under subclass 2. Subject matter wherein the significant structural details include means for preventing the formation of electric arcs when a circuit is broken or smothering an arc once it forms. The circuit may be broken at a plurality of points as by the provision of auxiliary arcing contacts shunting the main contacts or by means of a magnetic coil arranged adjacent the contacts wherein a magnetic field is generated which tends to repel and extinguish the arc.
- SEE OR SEARCH CLASS:
200, Electricity: Circuit Makers and Breakers, subclass 10 for nonmagnetically actuated switches with arc preventing or extinguishing means.
218, High-Voltage Switches With Arc Preventing and Extinguishing Devices, subclasses 1+ for nonmagnetically actuated switches with arc preventing or extinguishing means.
337, Electricity: Electrothermally or Thermally Actuated Switches, subclass 110 and 273+ for electrothermally actuated switches with arc prevention means.
361, Electricity: Electrical Systems and Devices, subclasses 2+ for safety and protection devices with arc suppression means and subclasses 117+ for high voltage dissipators, per se, especially subclasses 133+ for magnetic means.
- 202** This subclass is indented under subclass 2. Subject matter wherein the significant structural details include means for housing, enclosing or supporting an electromagnetic switch device. The housing or support means may include magnetic or electric shielding means or other details of construction whereby the casing or support contributes to the operation of the switch. One example of the devices to be found here are the so-called "lamp socket" switches.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
162, for plural switches with unitary housing or support means.
278, for magneto-mechanical motive device with casing or enclosure.
292, for hermetically sealed work or lifting electromagnet.
294, for outer casing or housing for work or lifting type electromagnet.

SEE OR SEARCH CLASS:

- 174, Electricity: Conductors and Insulators, subclasses 17+ for fluid filled or evacuated type housings, or boxes for electrical devices, subclasses 32+ for anti-inductive structures and subclasses 50+ for boxes and housings for electrical devices in general.
- 200, Electricity: Circuit Makers and Breakers, subclasses 51+ for switches combined with electrical connectors and subclass 168 for casing and bases for switches in general.
- 220, Receptacles, subclasses 3.2+ for outlet or junction box type receptacles which may house electric switches.
- 361, Electricity: Electrical Systems and Devices, subclasses 600+ for switchboards or the structural combination miscellaneous electrical components, housing structure in general, and particularly subclasses 627+ for switches that may include housings.
- 362, Illumination, subclass 394 for light sockets with special switch operators.

- 203** This subclass is indented under subclass 2. Subject matter wherein the structure includes significant details of armature structure or composition of matter with other switch structure in conventional language, as by name only, but which is sufficient to restrict the device to this class.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 55+, for liquid contact switches with significant armature structure.
- 80+, for polarity responsive switches with significant armature structure.
- 95+, for periodic switches at significant armature structure.
- 124+, for multiple contact type with significant armature.
- 154, for vacuum or reed switches with significant armature.
- 180+, for switches utilizing plural magnetic sources with a single armature.
- 232+, for polarized electromagnet with plural armatures.
- 235, for polarized electromagnet with vibrating reed or spring bar type armature.

- 249, for alternating current electromagnet with chatter prevent armature construction.
- 255, for electromagnets having plunger type armatures.
- 267, for electromagnets with plural armatures.
- 270, for electromagnets with special armature mounting means.
- 279, for electromagnets with armatures of particular shape, structure or material.

SEE OR SEARCH CLASS:

- 336, Inductor Devices, subclass 77, 117+ and 130+ for inductors with relatively movable core and coil structure.

- 204** This subclass is indented under subclass 2. Subject matter wherein at least a portion of the magnetic actuating structure of the switch device, usually the flux source or winding, consists of a portion of a bus bar or other conductor which comprises an integral part of the external circuit which is to be controlled. For example; the switch device may be directly attached to a bus bar in such a manner as to utilize the magnetic flux field surrounding the bus bar upon the passage of current therethrough to control an armature or other contact actuating means.

SEE OR SEARCH CLASS:

- 324, Electricity: Measuring and Testing, subclass 127 for electricity measuring devices employing a split core transformer surrounding a line conductor.
- 336, Inductor Devices, subclass 174 for inductor coil surrounding a linear conductor and subclasses 175+ for induction devices consisting of a core surrounding a linear conductor.
- 340, Communications: Electrical, subclasses 650+ for electrical condition responsive apparatus for electric line fault indicators means attached to a through conductor.

- 205** This subclass is indented under the class definition. Subject matter wherein the structure includes switch means whereby the actuation of the main contacts from an operative to an inoperative position or vice versa is entirely accomplished by means of permanent magnets.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 84+, for magnetic structure of polarity responsive switches.
- 137, for multiple contact switches with plural diverse magnets (e.g., electro-magnet and permanent magnet).
- 153, for vacuum or hermetically sealed type switches with permanent magnet.
- 179, for switches utilizing electromagnet and permanent magnet.
- 222, for relatively movable coil and permanent magnet.
- 229+, below, for magneto-mechanical devices utilizing permanent magnets.
- 302+, for permanent magnet structure, per se.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclasses 52+ for special application switches which may utilize permanent magnets, and other indented subclasses such as 61.41 for switches in special environment utilizing permanent magnets, subclass 80 for centrifugal switches, with permanent magnets, subclass 81.8 for fluid pressure actuated switches with permanent magnets, subclass 84 for float type switches utilizing permanent magnets, and subclass 404 for mechanical switches with permanent magnets.
- 310, Electrical Generator or Motor Structure, subclasses 103+ for magnetic field type torque transmitting clutches or brakes.
- 336, Inductor Devices, subclass 110 for inductor devices with permanent magnets.
- 337, Electricity: Electrothermally or Thermally Actuated Switches, subclass 2, for electrothermal or thermal actuated switches combined with other art switches which may be permanent magnet actuated, subclasses 54, 90, 134, and 344 for particular type thermal switches utilizing permanent magnets.
- 338, Electrical Resistors, subclass 12 for devices wherein a resistance is variably actuated by a movable magnet,

and subclass 32 for Hall effect type resistors.

- 340, Communications: Electrical, subclasses 2.2 through 2.31 for a channel selecting matrix and subclasses 14.1-14.69 for a decoder matrix utilizing permanent magnets.
- 361, Electricity: Electrical Systems and Devices, subclass 208 for circuits utilizing polarized relays.
- 365, Static Information Storage and Retrieval, appropriate subclass for magnetic storage systems particularly subclass 62 and 98 which may include permanent magnets.
- 439, Electrical Connectors, subclass 12 for connectors with magnet or suction cup.

206

This subclass is indented under subclass 205. Subject matter wherein the claimed structure comprises all the essential elements of two or more separate and distinct switch devices which may or may not employ common permanent magnet operation means and which if detached or removed from each of the other devices is capable of opening or closing an electrical circuit by means within the device.

- (1) Note. Consult the search notes under subclass 159.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 232+, for polarized electromagnet with plural armatures.
- 306, for plural permanent magnets, per se.

207

This subclass is indented under subclass 205. Subject matter wherein the permanent magnet means comprises a plurality of at least two or more such magnets.

- (1) Note. To complete the search for this subject matter consult the search notes under subclasses 177+ above.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 229+, for electromagnet and armature which may be combined with plural permanent magnets.
- 306, for the structure of plural permanent magnets, per se.

SEE OR SEARCH CLASS:

246, Railway Switches and Signals, subclass 249 for car actuated circuit controllers utilizing plural permanent magnets.

- 208** This subclass is indented under subclass 205. Subject matter wherein the magnetic structure is specifically recited as consisting of material whose magnetic properties are responsive to temperature conditions.

SEE OR SEARCH THIS CLASS, SUBCLASS:

146, for switch including thermomagnetic actuating means.
217+, for temperatures responsive magnets or electromagnets.

- 209** This subclass is indented under the class definition. Subject matter comprising magnets, which may be permanent magnets, electromagnets or a combination of the two types, or electromagnets with armatures, designed or arranged to perform external mechanical work.

- (1) Note. Coils, or coils with core whose proximate and sole purpose is to introduce inductance in an electrical circuit and which are not designed to perform external work are classified in Class 336, Inductor Devices.

SEE OR SEARCH THIS CLASS, SUBCLASS:

1, through 208, for magnets or electromagnets used in magnetically operated switches.

SEE OR SEARCH CLASS:

29, Metal Working, subclasses 602.1+ for methods of manufacturing transformers and inductances, and residual methods of manufacturing magnets and electromagnets which do not fall into Classes 148, 252 or 361. For the lines between these classes see the extensive notes to Class 29, subclass 602.1 and Class 148, Metal Treatment, subclass 100.

148, Metal Treatment, subclasses 100 through 122 for processes of improving the magnetic properties of mate-

rial having at least one component which is a free metal or alloy, other than by mere magnetization, and subclasses 31.55 and 31.57 for stock resulting from such processes.

198, Conveyors: Power-Driven, subclass 381, 439 and 619 for magnetic type conveyors.

209, Classifying, Separating and Assorting Solids, subclass 38, 39, 40, 212, 213+, and 478 for magnetic sorting or separation of solids.

210, Liquid Purification or Separation, subclasses 222+ for such subject matter having magnetic means to effect the purification or separation.

221, Article Dispensing, appropriate subclasses and see especially subclass 212 for magnetic article holding discharge assistants and the controls therefor.

242, Winding, Tensioning, or Guiding, subclasses 430+ for a process or apparatus for forming an article (e.g., a motor core, inductor, capacitor, or resistor) by winding material onto a core.

250, Radiant Energy, subclasses 281+ for ionic separation or analysis methods and apparatus which use magnets or electromagnets.

252, Compositions, subclasses 62.51+ for processes of making magnetic compositions, and the resulting product when it is claimed as stock or bulk material.

324, Electricity: Measuring and Testing, subclass 200 for magnetic testing devices utilizing magnets and electromagnets or inductors, and subclasses 76.11+ for electric meters utilizing magnets and electromagnets.

336, Inductor Devices, appropriate subclasses for the structure of transformers and inductive reactors of general utility. See (1) Note above.

600, Surgery, subclasses 9+ for electromagnets utilized in surgery and diagnostics.

- 210** This subclass is indented under subclass 209. Subject matter relating to electronic or ionic beam deflecting magnets.

- (1) Note. The electromagnets and permanent magnets in this and the indented subclasses are adapted for use with electron or ion beam deflecting devices of Classes 250, Radiant Energy and 313, Electric Lamp and Discharge Devices. The electromagnet, for example, may be a beam sweeping magnet and the permanent magnet may be a positive ion deflecting magnet.
- (2) Note. This subclass and indented subclasses, provide for the permanent magnet or electromagnet, per se, adapted for use with electron beam tubes but does not provide for the beam deflecting magnet in combination with significant details of the electron beam tube or the control circuit for the magnets or the electron beam tube. For such combinations, see the search notes below.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 201, for electromagnetically actuated switches with arc suppression or extinguishing means.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclass 10 for multiple circuit pivoted contact switches.
- 218, High-Voltage Switches With Arc Preventing and Extinguishing Devices, subclasses 1+ for switches in general with arc preventing and extinguishing magnets.
- 250, Radiant Energy, subclasses 281+ for ionic separation or analysis methods or apparatus which use magnets or electromagnets and subclasses 396+ for electron or ion beam deflection or focussing systems which use magnets or electromagnets.
- 313, Electric Lamp and Discharge Devices, subclasses 153+ and 364+, in particular 421+ for space discharge devices having electronic and ionic beam deflecting means.
- 315, Electric Lamp and Discharge Devices: Systems, subclasses 364+ for cathode ray tube systems having beam deflecting means.

- 337, Electricity: Electrothermally or Thermally Actuated Switches, subclass 281 for fusible element type switches with magnetic blowout means.
- 361, Electricity: Electrical Systems and Devices, subclasses 134+ for lightning arresters having arc blowout magnets.

211 This subclass is indented under subclass 210. Subject matter wherein the electronic or ionic beam deflecting magnet includes a magnetic shunt path for the magnetic flux produced by the deflecting magnet. The shunt magnetic path is an auxiliary magnetic path in addition to the main magnetic path.

- (1) Note. The magnetic shunt path may or may not be adjustable to vary the degree of magnetic shunt.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 236, for magnets or electromagnets including a magnetic shunt path.

212 This subclass is indented under subclass 210. Subject matter wherein the magnetic elements of the electronic or ionic beam deflecting magnets are adjustable with respect to each other and/or with respect to the tube to vary the position of the electronic or ionic beam.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 237, for electromagnets with adjustable shunt means.
- 273, for electromagnets with armature adjusting means.

213 This subclass is indented under subclass 210. Subject matter including significant structural details of a coil of the magnetic deflecting means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 282, for electromagnet with armature having particular coil shape, structure or material.
- 299+, for electromagnet coil structure or material in general.

SEE OR SEARCH CLASS:

315, Electric Lamp and Discharge Devices: Systems, subclasses 399+ for cathode- ray tube systems, subclasses 368.25+ for mechanical structure of a coil in a color convergence circuit; and in general with electromagnetically controlled sweeping of the cathode ray.

- 214** This subclass is indented under subclass 213. Subject matter including electric or magnetic shielding means in combination with the coil structure for shielding at least part of the beam deflecting means from external electric or magnetic fields, or for preventing the coil of the deflecting means from emanating undesired electric or magnetic fields.

SEE OR SEARCH THIS CLASS, SUBCLASS:

202, for electromagnetic switch with electric or magnetic shielding means.
301, for shielding means in combination with magnets or electromagnetic relays not particularly related to electron or ionic beam deflection.

SEE OR SEARCH CLASS:

174, Electricity: Conductors and Insulators, subclass 35 for shields or screens, per se, of general utility.
336, Inductor Devices, subclass 84 for inductor devices provided with shield means.

- 215** This subclass is indented under subclass 209. Subject matter wherein a portion of the magnet or electromagnet includes material having magnetostriction properties.

- (1) Note. Magnetostriction is the property, exhibited by some materials, by which their dimensions change when placed in a magnetic field.

SEE OR SEARCH THIS CLASS, SUBCLASS:

3, above for electromagnetically actuated switches with magnetostrictive elements.

SEE OR SEARCH CLASS:

310, Electrical Generator or Motor Structure, subclass 26 for dynamoelectric devices with magnetostrictive material.
318, Electricity: Motive Power System, subclass 118 for magnetostrictive electric motor system.
336, Inductor Devices, subclass 20 for inductor devices with deformable cores of magnetostrictive material.
361, Electricity: Electrical Systems and Devices, subclasses 206+ for electric circuit for magnetostrictive relay or electromagnet.
367, Communications, Electrical: Acoustic Wave Systems and Devices, subclass 168 for this subject matter utilized in underwater transducers such as used, for example, in sonar systems.

- 216** This subclass is indented under subclass 209. Subject matter wherein the magnet or electromagnet has a superconductive element included therein as an active element of the magnet.

- (1) Note. Superconductivity is the property exhibited by some metals, alloys and compounds wherein the reduction of the temperature of the material to within a few degrees of absolute zero causes a steady fall in the resistance of the material until a critical temperature (transition temperature) is reached, and then the resistance falls suddenly to zero or practically to zero.
- (2) Note. This subclass provides for magnets or electromagnets with superconductors included therein as an active portion of the magnet or electromagnet, but does not provide for superconductors, per se. Superconductors are found in various classes, depending upon the type of device which the superconductor is used. See the search notes below for other superconductors.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

217, for temperature responsive type magnets or electromagnets that do not involve super-conductivity.

SEE OR SEARCH CLASS:

174, Electricity: Conductors and Insulators, subclasses 15.4+ and 125.1 for superconductor structure.

336, Inductor Devices, subclass 155 for super-conductive inductive devices with no relatively moving parts.

361, Electricity: Electrical Systems and Devices, subclasses 139+ for electric circuits for electromagnets including super-conductors.

217 This subclass is indented under subclass 209. Subject matter wherein the magnet or electromagnet is designed or constructed to change its operating characteristics responsive to variation in temperature, or includes temperature responsive elements to effect such a change.

(1) Note. The temperature responsive element may be, for example, a temperature sensitive biasing means or a portion of the magnet such as, for example, a shunt means or the core may include temperature sensitive material.

(2) Note. The temperature sensitive means may be responsive to ambient temperature or responsive to the temperature change due to current flow in the magnet.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

37, for switches with plural automatic trips including a thermal magnetic element.

43+, for electromagnetically actuated switches with thermal trips.

146+, for multiple contact type switches with thermal current responsive means.

208, for permanent magnet actuated switches of the thermomagnetic type.

216, for superconductive type magnet or electromagnet.

SEE OR SEARCH CLASS:

361, Electricity: Electrical Systems and Devices, subclasses 161+ for temperature responsive electromagnet with circuit.

218 This subclass is indented under subclass 217. Subject matter including means to produce a predetermined time interval between the energizing instant and the time of operation of the magnet or electromagnet.

(1) Note. The time interval may be determined by a thermal element, a dashpot or any other time delay device.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

28+, for automatic reclosing or resetting switches with time delay means, especially subclass 31 for thermally actuated delay means.

39+, for switches with magnetic latch means with time delay means.

59+, for retarded or delayed switches in general, particularly subclass 66 for electrothermal delay means.

239+, for nontemperature responsive magnets or electromagnets with time delay means.

219 This subclass is indented under subclass 209. Subject matter wherein the magnet or electromagnet is combined with devices or structures of other art classes, the art device being claimed so broadly as to form no basis for classification in the art device class.

220 This subclass is indented under subclass 209. Subject matter including one or more armatures operated by one or more electromagnets.

(1) Note. This subclass and the indented subclasses include the electromagnet and armature combinations, per se. For the combination of electromagnet with armature and diverse type art device, see subclass 219.

(2) Note. The combination of an electromagnet with armature and contacts is excluded from this subclass and is classi-

fied above as an electromagnetically actuated switch.

221 This subclass is indented under subclass 220. Subject matter wherein the armature is actuated when the electromagnet is excited with a supply signal of a predetermined frequency or range of frequencies.

- (1) Note. This subclass includes electromagnets with armature in which the armature is actuated in response to a predetermined change or shift in frequency.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 4+, for radio frequency switches such as the T/R type.
70, for frequency responsive or synchronous motor operated switches.
94, for frequency responsive vibratory reed type switches.
101, for alternating current switches responsive to preselected or synchronous frequency.
243, for alternating current actuated electromagnets with armature.

SEE OR SEARCH CLASS:

- 307, Electrical Transmission or Interconnection Systems, subclass 129 for frequency responsive transmission or interconnection electrical switching systems.
318, Electricity: subclass 147 for electrical circuit for frequency responsive relay or electromagnet.

222 This subclass is indented under subclass 220. Subject matter including a permanent magnet and a coil suspended or positioned within the magnetic field of the permanent magnet for relative movement with respect to the permanent magnet; the relative movement being caused by interaction of a magnetic field produced in the coil and the magnetic field of the permanent magnet.

- (1) Note. This subclass includes the electromagnetic portion of the D'Arsonval type galvanometer but does not provide for the complete galvanometer which is located in Class 324, Electricity: Mea-

suring and Testing, subclasses 144+, especially subclass 146.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 148+, for electrodynamically actuated switches with moving coils.

SEE OR SEARCH CLASS:

- 310, Electrical Generator or Motor Structure, subclasses 10+ for electric generators or motor structure which include subject matter as provided for in this subclass.
324, Electricity: Measuring and Testing, subclasses 76.11+ for apparatus for measuring, testing or sensing devices with a moving coil especially subclass 146 (see (1) Note above).

223 This subclass is indented under subclass 220. Subject matter including plural conductors mounted such that at least one conductor is movable relative to the other.

- (1) Note. The plural conductors may be plural coils, one of which is fixed and the other is movable as in electrodymanometer, wherein the movement between the two coils is produced by the interaction of the magnetic field of the coils.
(2) Note. This subclass also includes electromagnets wherein the coil or core of the electromagnet is movable toward the armature.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 68+, for electric motor actuated switches.
148+, for electrodynamically actuated switches with moving coils.

SEE OR SEARCH CLASS:

- 310, Electrical Generator or Motor Structure, subclasses 10+ for electric generators or motor structure which include subject matter as provided for in this subclass.
324, Electricity: Measuring and Testing, subclasses 76.11+ for apparatus for measuring, testing or sensing electricity, per se, using relatively movable

conductors, see especially subclasses 144+.

- 224** This subclass is indented under subclass 223. Subject matter wherein one of the relatively movable conductors induces a current by electromagnetic induction into at least one of the other conductors.

- (1) Note. The said other conductor may be, for example, an eddy current member.

SEE OR SEARCH CLASS:

- 310, Electrical Generator or Motor Structure, subclasses 10+ for electric generators or motor structure which include subject matter as provided for in this subclass.
324, Electricity: Measuring and Testing, subclasses 76.11+ for apparatus for measuring, testing or sensing electricity using relatively movable conductors, see especially subclasses 137+.

- 225** This subclass is indented under subclass 224. Subject matter wherein one movable conductor is a rotating disk.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 272, for electromagnets with rotating armature.

SEE OR SEARCH CLASS:

- 310, Electrical Generator or Motor Structure, subclasses 166+ for induction generator or motor structure which may include rotating disk type moving conductor and subclass 268 for disc armature structure, per se.
324, Electricity: Measuring and Testing, subclasses 137+ for electrical meters using rotating disk type moving conductors.
361, Electricity: Electrical Systems and Devices, subclasses 139+ for electric circuits for relays and electromagnets having rotating disk type movable conductor, especially subclasses 143+.

- 226** This subclass is indented under subclass 224. Subject matter in which one of the conductors is a short circuited coil or winding.

- (1) Note. The short circuited winding may be of the type which is known as a shading coil.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 100, for electromagnetically actuated switches with short circuited winding or closed loop.

SEE OR SEARCH CLASS:

- 310, Electrical Generator or Motor Structure, subclass 172 for motor or generator structure with short circuited winding.
318, Electricity: Motive Power Systems, particularly subclass 750 and 781+ for motor control systems for shaded pole induction motors.
324, Electricity: Measuring and Testing, subclasses 137+ for electrical meters using short circuited winding.
336, Inductor Devices, subclass 76 for the structure of inductive devices having a short circuited coil or single conductive member (e.g., rings, bands, discs, etc., of conductive material).

- 227** This subclass is indented under subclass 220. Subject matter wherein the core or armature is designed to magnetically saturate within the normal current operating range of the device.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 84+, for polarity responsive switch with magnetic structure that may be saturable.

SEE OR SEARCH CLASS:

- 336, Inductor Devices, subclasses 155+ for the structure of inductive regulators of the saturable type.

- 228** This subclass is indented under subclass 220. Subject matter including means to convert the motion of the armature into an effective motion of a different type.

- (1) Note. This subclass includes means, such as cams, screws, gears or other mechanical movement means to convert, for example, a reciprocal motion of

a plunger type armature to a useful rotary motion.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 73, for motor actuated contacts utilizing eccentric or cam actuator.
- 110, and 122+, for multiple contact type electromagnetically actuated switches with motion conversion means.
- 140, for step-by-step switch with ratchet and pawl actuator.
- 189+, for switch contact actuator utilizing mechanical linkage.
- 261, for plunger type armature structure or material.
- 272, for rotating armature type electromagnet.

SEE OR SEARCH CLASS:

- 74, Machine Element or Mechanism, appropriate subclass for various motion conversion means, see especially subclasses 99+ for reciprocating to or from oscillating motion and subclasses 112+ for rotary to intermittent unidirectional motion.
- 310, Electrical Generator or Motor Structure, subclasses 20+ for reciprocating dynamoelectric devices with motion conversion means and subclasses 80+ for rotary dynamoelectric machines with motion conversion mechanism.

229 This subclass is indented under subclass 220. Subject matter wherein the magnetomechanical motive device includes a permanent magnet in combination with the electromagnet.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 137, for multiple contact electromagnetically actuated switches including a permanent magnet.
- 153, for vacuum or hermetically sealed switches with permanent magnet.
- 179, for electromagnetically actuated switches with plural magnets of diverse magnetic characteristics, including permanent magnet.
- 205+, for permanent magnet actuated switches.

222, for relatively movable coil and permanent magnet such as D'Arsonval type devices.

302+, for permanent magnet structure.

SEE OR SEARCH CLASS:

- 336, Inductor Devices, especially subclass 110 for inductor device with permanent magnet.

230 This subclass is indented under subclass 229. Subject matter wherein the permanent magnet is combined with the electromagnet such that the movement of the armature is responsive to the direction of current flow in the armature controlling circuit.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 78+, for polarity responsive electromagnetically actuated switches.

SEE OR SEARCH CLASS:

- 361, Electricity: Electrical Systems and Devices, subclass 208 for electric circuit for polarized relays and electromagnets.

231 This subclass is indented under subclass 230. Subject matter wherein the armature or mechanical means which is adapted to be moved by the polarized electromagnet, is of a type movable to varying positions between two extreme positions, responsive to the intensity of the alternating current energizing signal.

(1) Note. This subclass includes polarized electromagnets having armatures of the type that are used for loudspeakers.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 99+, for alternating current type switches.
- 222, for relatively movable coil and permanent magnet.
- 243+, for alternating current type electromagnets.

SEE OR SEARCH CLASS:

- 361, Electricity: Electrical Systems and Devices, subclasses 143+ for electric circuit for alternating current relay or electromagnet.

- 369, Dynamic Information Storage or Retrieval, subclass 147 for similar subject matter utilized in phonograph disc recording tone arms.
- 381, Electrical Audio Signal Processing Systems and Devices, subclass 177 and 400+.
- 232** This subclass is indented under subclass 230. Subject matter wherein the polarized electromagnet actuates plural armatures.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 119+, for multiple contact switches utilizing plural armatures.
- 184, for switches with plural magnets and plural reciprocating armatures aligned or rigidly connected.
- 242, for electromagnet with time delay means wherein plural armatures are selectively retarded.
- 259, for plural plunger type armatures.
- 265, for nonpolarized type plural armatures actuated by single electromagnetic coil.
- 267, for plural electromagnets with plural armatures.
- 233** This subclass is indented under subclass 232. Subject matter including means to lock at least one of the armatures of the polarized electromagnet in either the open or closed position, responsive to the energization of the electromagnet.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 21+, for automatic circuit interrupting type switches with latch means.
- 77, for switches combined with motors, the switch having locking means.
- 120, for multiple contact switches with interlocking plural armatures.
- 164, for switches with manually or gravity operated latch means.
- 167+, for switches with latching means.
- 253+, for electromagnets with armature latch means.
- SEE OR SEARCH CLASS:
- 361, Electricity: Electrical Systems and Devices, subclasses 192+ and 194 for electric circuit for magnets or relays with interlocking or holding means.
- 234** This subclass is indented under subclass 230. Subject matter wherein the electromagnet is energized by direct current signal, the polarity of which determines the direction of flux flow and consequently the movement of the armature.
- (1) Note. This subclass provides for polarized electromagnets wherein a permanent magnet holds the armature in one position until the electromagnet is energized with a direct current signal of the proper polarity to produce a flux flow to overcome the attraction of the permanent magnet.
- (2) Note. This subclass also provides for polarized electromagnets wherein the armature normally is in a balanced state and is moved in one direction or the other responsive to the polarity of the direct current signal applied to the electromagnet.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 78+, for polarity responsive electromagnetically actuated switches.
- 231, for polarized electromagnets responsive to varying alternating current amplitude.
- SEE OR SEARCH CLASS:
- 307, Electrical Transmission or Interconnection Systems, for polarity responsive switching systems.
- 361, Electricity: Electrical Systems and Devices, subclass 77 for reverse phase responsive protective systems, subclasses 78+ for reverse energy or current, and subclass 208 for polarized electromagnets with circuits.
- 235** This subclass is indented under subclass 230. Subject matter wherein the armature of the polarized electromagnet is a vibrating reed or spring bar type.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 93+, for switches with vibratory reed type armature.
- 203, for switch armature structure.
- 231, for varying alternating current amplitude responsive polarized electromagnets.
- 252, for alternating current type electromagnets with vibrating armature.
- 266, for plural coils with vibrating armatures.

236 This subclass is indented under subclass 220. Subject matter wherein the electromagnet includes at least two magnetic flux paths, one of which is a secondary or shunt flux path.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 12, for automatic circuit interrupting switches with shunting contacts.
- 211, for electron or ion beam deflecting magnet with magnetic shunt.
- 295, for permanent magnets with hold strength control means.

SEE OR SEARCH CLASS:

- 310, Electrical Generator or Motor Structure, subclass 190 and 191 for similar subject matter in dynamoelectric machines.
- 322, Electricity: Single Generator Systems, subclass 50 for electric generator having a magnetic shunt.
- 336, Inductor Devices, subclass 133 for inductive devices with plural part cores having an adjustable magnetic shunt, and subclasses 160+ for the structure of inductive regulators with magnetic shunts.

237 This subclass is indented under subclass 236. Subject matter wherein the reluctance of the shunt path is adjustable to vary the magnetic flux flow therethrough.

SEE OR SEARCH CLASS:

- 310, Electrical Generator or Motor Structure, subclass 190 for field winding with adjustable shunt and subclass 191 for adjustable magnetic field structure.

- 336, Inductor Devices, subclass 133 for inductive devices with plural part cores, having an adjustable magnetic shunt.

238 This subclass is indented under subclass 220. Subject matter including auxiliary means to move the armature, in addition to the electromagnetic means.

- (1) Note. The auxiliary means may be, for example, a manual means to move the armature into position to be held by the electromagnetic means, or an auxiliary means for actuating the armature in case of power failure.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 27, for automatic interrupter with automatic combined with manual reclosing means.
- 164, for electromagnetic switch with manually operated latch and electromagnetic trip.
- 186, for electromagnetic switch combined with manual actuator.

239 This subclass is indented under subclass 220. Subject matter including means to produce a predetermined time interval between the energizing instant and the time of operation of the electromagnet.

- (1) Note. The time interval may be determined, for example, by reluctance control means or dashpot means.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 28+, for automatic reclosing or resetting switches combined with timing or delay means.
- 39+, for automatic switches with magnetic latch means having time delay.
- 59+, for retarded or delayed type switches.
- 139, for step-by-step type switches with timing or indexing means.
- 218, for temperature responsive type magnet and electromagnets with time delay means.

SEE OR SEARCH CLASS:

- 74, Machine Element or Mechanism, subclass 1.5 for miscellaneous escape-ments.
- 307, Electrical Transmission or Interconnection Systems, subclasses 141+ for switching actuation systems with time delay or retardation means.
- 361, Electricity: Electrical Systems and Devices, subclasses 195+ for electric circuits for relays and electromagnets with time delay.
- 368, Horology: Time Measuring Systems or Devices, subclasses 124+ for escapement mechanisms used in horology.

- 240** This subclass is indented under subclass 239. Subject matter wherein a dashpot means is used to provide the time delay.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 29, for reclosing or resetting latch or trip means for automatic circuit interrupter with fluid controlled delay.
- 61, for switches with pneumatic delay means such as dashpot, for example.
- 62, for switches with hydraulic delay means.

SEE OR SEARCH CLASS:

- 188, Brakes, subclasses 266+, for a fluid-resistance brake or shock absorber of general utility.

- 241** This subclass is indented under subclass 239. Subject matter wherein an auxiliary control coil or magnet is used to provide the time delay.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 63, for switches with magnetic or electromagnetically actuated delay means.

- 242** This subclass is indented under subclass 239. Subject matter including plural armatures with time delay means for delaying different armatures at different time intervals.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 60, for switches with plural sets of contacts selectively or differently delayed.
- 232+, for polarized electromagnets with plural armatures.
- 259, for plural plunger type armatures.

- 243** This subclass is indented under subclass 220. Subject matter wherein the electromagnet and armature is particularly adapted for operation by alternating current.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 99+, for alternating or fluctuating current type switches.
- 204, for through conductor type switch.
- 223+, for relatively movable conductor (dynamometer) type devices.
- 231, for polarized electromagnet responsive to varying alternating current amplitude.
- 236, for alternating current type electromagnet with shunt flux path.
- 239+, for alternating current type electromagnet with time delay.

SEE OR SEARCH CLASS:

- 361, Electricity: Electrical Systems and Devices, subclasses 143+ for electric circuit for alternating current relays and electromagnets.

- 244** This subclass is indented under subclass 243. Subject matter including means to cause a phase shift between the magnetic flux produced in plural windings or in separate portions of the electromagnet.

- (1) Note. This subclass provides for electromagnets having plural windings and means to apply current of different phase to at least two of the plural windings.
- (2) Note. This subclass provides for the combination of a two winding electromagnet with a dephasing circuit for converting single phase current into plural phase current.

- (3) Note. This subclass provides for electromagnets wherein the electromagnet has sections thereof made of different materials to cause a phase of one section to be delayed with respect to the phase of another section.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 247, for alternating current type electromagnets with chatter or noise preventing means which may include phase displacement means.

SEE OR SEARCH CLASS:

- 318, Electricity: Motive Power Systems, subclasses 781+ for induction motor system utilizing phase conversion.
363, Electric Power Conversion Systems, subclasses 148+ for phase conversion circuits.

- 245** This subclass is indented under subclass 244. Subject matter wherein the flux phase displacement is obtained by the use of a shading coil.

- (1) Note. A shading coil is a short-circuited coil in which the circulating current lags behind the flux which induces the current.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 104, for switches with chatter or noise preventing means which may include shading coils.
247, for electromagnets with chatter or noise preventing means including shading coils.

SEE OR SEARCH CLASS:

- 310, Electrical Generator or Motor Structure, subclass 172 for alternating current dynamoelectric devices with shading means.
361, Electricity: Electrical Systems and Devices, subclasses 139+ for electric circuits for alternating current electromagnets with shading coils.

- 246** This subclass is indented under subclass 244. Subject matter having plural windings in the electromagnet and having means to apply cur-

rent of different phase to the different windings.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 8, for polyphase type automatic circuit interrupters.
102, for alternating current switches of the polyphase type.

- 247** This subclass is indented under subclass 243. Subject matter including means to prevent or decrease chatter or hum noise of the armature.

- (1) Note. The chatter or hum noise of the armature is caused by vibration of the armature relative to the stop means. One cause of this type of vibration is alternating current relays in the alternations of the current when the relay is energized.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 46, for automatic circuit interrupting switches with vibration preventing means.
90, for periodic switches with vibrating damping means.
104, for alternating current switches with chatter or bounce preventing means.
157+, for switches with operation inhibiting means.
193, for contact actuator with vibration, bounce or vibration prevention means.
244+, for alternating current magnets with flux phase displacement means which may also prevent vibration or chatter.
271, for armature mounting means with vibration preventing means.

SEE OR SEARCH CLASS:

- 248, Supports, subclasses 560+ for resilient supports.
336, Inductor Devices, subclass 100 for inductor devices (e.g., transformers and inductive reactors) having vibration control.

- 248** This subclass is indented under subclass 247. Subject matter wherein the chatter or noise preventing means include spring or cushion type vibration absorbers.

- 249** This subclass is indented under subclass 247. Subject matter wherein the armature is specially constructed or mounted to prevent vibration noise.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 257, for plunger type armatures with vibration preventing means.
271, for armature mounting means with vibrating preventing means.
277, for electromagnets specially mounted or enclosed to prevent shock or vibration.

- 250** This subclass is indented under subclass 243. Subject matter including significant details of the alternating current coil construction or coil mounting means.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 282, for coil structure or material for electromagnet and armature not specially constructed for operation by alternating current.
299+, for coil structure or material in general.

- 251** This subclass is indented under subclass 243. Subject matter wherein the armature is in the form of a solenoid core or plunger.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 52+, for conductive liquid fluid type switches with piston or plunger.
131, for multiple contact switch with reciprocating armature.
255+, for nonalternating current type electromagnets with plunger type armature.

SEE OR SEARCH CLASS:

- 361, Electricity: Electrical Systems and Devices, subclasses 160+ for electric circuits for plunger type alternating current electromagnets.

- 252** This subclass is indented under subclass 243. Subject matter wherein the armature of the alternating current electromagnet is mounted to have a back and forth or vibration movement

responsive to the alternation of the alternating current.

- (1) Note. The armature may vibrate because the electromagnet is supplied with alternating current, or the armature may vibrate because the alternating current is periodically interrupted as, for example, by an interrupter switch.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 87+, for periodic (e.g., vibrator) switches particularly subclasses 93+ and 95+ for vibrating armature structures.
215, for magnetostrictive type electromagnets with vibrating armature.

- 253** This subclass is indented under subclass 220. Subject matter including armature latch means responsive to movement of an armature to latch or hold said armature or another armature in a particular position.

- (1) Note. This subclass provides for electromagnets with plural armatures wherein the movement of one armature actuates a latch means to prevent the operation of another armature.

- (2) Note. The armatures of this subclass may be locked in the open or closed position.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 21+, for automatic circuit interrupters with latch or trip means.
77, for motor actuated switches with latch.
113, for multiple contact automatic telephone type switch with latch.
160+, for interlocking switches.
167+, for switches with latching means.
233, for polarized electromagnet with latching means.
274, for magnetic armature holding or locking means such as magnetic biasing means.

SEE OR SEARCH CLASS:

- 74, Machine Element or Mechanism, subclass 483 for mechanical locking or interlocking means for machine ele-

- ments and subclasses 527+ for detent type locking means.
- 200, Electricity: Circuit Makers and Breakers, subclass 50 for interlocking switches.
- 361, Electricity: Electrical Systems and Devices, subclass 194 for control circuits for electromagnetic devices including a holding means.
- 254** This subclass is indented under subclass 253. Subject matter wherein the armature latch means is positioned in the latch or unlatch position by the attractive or repulsive force of an energized coil winding.
- (1) Note. The latch control winding is usually an auxiliary winding which does not control the operation of the armature.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 170, for switches with magnetically operated latch means.
- 274, for magnetic armature holding or locking means such as a magnetic biasing means.
- SEE OR SEARCH CLASS:
- 361, Electricity: Electrical Systems and Devices, subclass 194 for control circuits for electromagnetic devices including a holding means.
- 255** This subclass is indented under subclass 220. Subject matter wherein the armature is in the form of a core or plunger mounted for movement within the coil or solenoid of the electromagnet.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 52+, for conductive liquid type switches with magnetic plunger or piston.
- 217, for temperature responsive electromagnets with plunger type armature.
- 239, for time delay electromagnet with plunger type armature.
- 251, for alternating current electromagnet with plunger type armature.
- SEE OR SEARCH CLASS:
- 124, Mechanical Guns and Projectors, subclass 3 for electromagnetic solenoid means for linearly moving a magnetic projectile through the barrel of a projecting device.
- 310, Electrical Generator or Motor Structure, subclass 14 for linear motor of the solenoid and core type, subclasses 23+, 30 and 34+ for dynamoelectric device with reciprocating plungers.
- 336, Inductor Devices, subclasses 130+ for inductor with relatively movable core and coil, particularly subclass 136 for inductor with telescoping core and coil.
- 361, Electricity: Electrical Systems and Devices, subclasses 139+ for control circuit for plunger type relays or electromagnets.
- 256** This subclass is indented under subclass 255. Subject matter wherein the electromagnet has plural coils that control a single plunger type armature.
- (1) Note. The plural coils may be separately energized or may be simultaneously energized.
- (2) Note. The plural coils may be arranged so that the armature is moved in one direction or the other, depending upon which coil is energized.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 266+, for nonplunger type armature controlled by plural coils.
- SEE OR SEARCH CLASS:
- 310, Electrical Generator or Motor Structure, subclasses 34+ for dynamoelectric devices with plunger controlled by plural coils.
- 361, Electricity: Electrical Systems and Devices, subclass 210 for control circuits for relays and electromagnets with plural coils.
- 257** This subclass is indented under subclass 255. Subject matter including means to absorb the shock of the armature when coming to rest

against an armature stop, thereby preventing vibration of the armature.

- (1) Note. The shock absorber means may be a spring means or other resilient material serving as a cushion to stop the armature movement with minimum of armature vibration.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 46, for automatic circuit interrupters with undesirable motion prevention means.
104, for alternating current switches with vibration preventing means.
193, for switches with vibration or bounce preventing means.
247, for alternating current electromagnet with chatter or noise preventing means.
271, for electromagnet armature mounting means with armature bounce or vibration preventing means.
277, for electromagnet mounting arrangement with shock absorption.

258 This subclass is indented under subclass 255. Subject matter including means to adjust the distance of the armature movement when the electromagnet is energized.

- (1) Note. This subclass includes adjustable armature stop means or adjustable biasing means for determining the distance the plunger type armature moves into the solenoid.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 273, for adjusting means for nonplunger type armature.
274, for electromagnet armature biasing means or bias adjustment means.

259 This subclass is indented under subclass 255. Subject matter including plural plunger type armatures.

- (1) Note. This subclass includes plural plunger type armatures operated by a single electromagnetic coil.

- (2) Note. Also included in this subclass are plural electromagnetic coils each operating one or more plunger type armatures.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 267, for electromagnets having plural coils and plural armatures that are not plunger type armatures.

260 This subclass is indented under subclass 255. Subject matter wherein the plunger type armature of the electromagnet is enclosed in a sealed moisture or dust proof enclosure.

- (1) Note. The sealed moisture-proof case may enclose the armature only or it may enclose the entire electromagnet.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 52+, for plunger operated conductive liquid switches.
151, for vacuum or hermetically sealed switches.
202, for switches with housing means.
278, for electromagnets with casing or enclosure.

261 This subclass is indented under subclass 255. Subject matter including details of the structure of the plunger type armature, details of the material of which the armature is made, or details of both the structure and the material.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 203, for switches with significant armature structure.
251, for alternating current electromagnet with plunger type armature construction or mounting means.
279+, for electromagnets with significant armature structure, of types other than plunger type armatures.

262 This subclass is indented under subclass 261. Subject matter including means to center or align the plunger type armature in the solenoid coil or means to guide the plunger during its movement relative to the coil when the coil is energized.

- 263** This subclass is indented under subclass 261. Subject matter including means in combination with the plunger type armature to prevent rotation of the armature relative to the solenoid coil or casing.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 262, for electromagnets with plunger type armature having centering, aligning or guide means which may also serve to prevent rotation of the armature relative to the solenoid coil or casing.

- 264** This subclass is indented under subclass 261. Subject matter wherein the plunger type armature includes a plurality of sections, at least one of said sections being movable relative to another section.

- 265** This subclass is indented under subclass 220. Subject matter wherein plural armatures are located with respect to a coil such that each armature is operated when the coil is energized.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 119+, for multiple contact switches with plural armatures.
232+, for polarized electromagnets with plural armatures.
242, for electromagnet with plural armatures selectively retarded.
259, for plural plunger type armatures which may be operated by a single coil winding.

SEE OR SEARCH CLASS:

- 361, Electricity: Electrical Systems and Devices, subclasses 139+ and appropriate subclasses for control circuits for electromagnetic devices having plural armatures.

- 266** This subclass is indented under subclass 220. Subject matter wherein the electromagnets includes plural coils or magnets arranged to operate at least one armature.

- (1) Note. For classification in this subclass and the indented subclasses, the movement of at least one armature is con-

trolled by the magnetic flux produced by two or more coils or magnets.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 8+, for multipole or polyphase automatic circuit breakers.
92, for periodic switches with plural actuating magnets.
102, for polyphase alternating current type switches.
103, for alternating current switches with plural flux sources.
136+, for multiple contact switches with plural magnet or coil means.
149, for electrodynamically actuated switches with plural coils.
177+, for switches with plural magnets or flux sources.
207, for switches with plural permanent magnets.
229+, for electromagnet and permanent magnet with armature.
246, for alternating current electromagnet with plural flux displacement windings.
256, for electromagnets with plural plunger type armatures.

SEE OR SEARCH CLASS:

- 361, Electricity: Electrical Systems and Devices, subclass 210 for control circuits for relays and electromagnets with plural coils.

- 267** This subclass is indented under subclass 266. Subject matter including plural armatures.

- (1) Note. For classification in this subclass, at least one of the plural armatures is responsive to the magnetic flux of two or more of the magnetic coils or magnets.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 119+, for automatic telephone type switches with plural armatures.
184, for plural magnet switches with plural integral reciprocating armatures.
232+, for polarized electromagnets with plural armatures.
259, for electromagnets with plural plunger type armatures.

SEE OR SEARCH CLASS:

361, Electricity: Electrical Systems and Devices, subclasses 139+ and appropriate subclasses for control circuits for electromagnetic devices with plural armatures.

- 268** This subclass is indented under subclass 266. Subject matter wherein the plural coils of the electromagnet can be energized independently of each other.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

107+, for multiple contact switches with the contacts being selectively actuated.
256, for electromagnets with plural coils and single plunger type armature.

- 269** This subclass is indented under subclass 220. Subject matter including: armature mounting means; means forming part of the armature; means operating with the armature or a combination of these means to balance the armature so that it is insensitive to acceleration or deceleration.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

46, for automatic circuit interrupter with contact rebound or other undesirable motion prevention means.
157+, for switches with shock resistant means.
193, for switches with contact vibration, bounce or chatter prevention means.
257, for plunger type armatures with shock absorbing means.
271, for armature mounting means with vibration preventing means.
277, for electromagnets constructed or mounted to prevent shock, vibration or bounce.

- 270** This subclass is indented under subclass 220. Subject matter wherein the subject matter includes details of the armature mounting means.

(1) Note. This subclass includes armature that are statically balanced by placing the pivot of the armature at the center of gravity of the armature.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

249, for armature mounting to prevent chatter or noise.
251, for alternating current electromagnet with plunger type armature.
255, for direct current electromagnet with plunger type armature.
279+, for armature shape, structure or material in general.

- 271** This subclass is indented under subclass 270. Subject matter including means to prevent vibration of the armature when it contacts an armature stop.

(1) Note. The means to prevent vibration of the armature may include, for example, fluid type rebound damping means, elastic or resilient material or weight on the armature.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

46, for automatic circuit interrupting switches with contact rebound or other undesirable motion preventing means.
90, for periodic switches with vibration damping means.
104, for alternating current switches with chatter, bounce or vibration preventing means.
157+, for switches with operation inhibiting means (shock resistant).
193, for switches with contact actuating means with vibration bounce or chatter prevention means.
247, for alternating current electromagnets with chatter or vibration preventing means.
257, for plunger type armature with shock absorbing means.
277, for electromagnets mounted to prevent or absorb shock.

SEE OR SEARCH CLASS:

248, Supports, subclasses 560+ for resilient supports.
336, Inductor Devices, subclass 100 for inductor devices (such as transformers and inductive reactors) with vibration control means.

272 This subclass is indented under subclass 270. Subject matter wherein the armature is in the form of a disk or a cylindrical member and is mounted so that when the electromagnet is energized, the armature revolves on its support or about its center, within a plane perpendicular to the support means.

- (1) Note. The rotation of the armature may be a complete revolution or a partial revolution.
- (2) Note. This subclass does not provide for armatures mounted for pivotal movement such that the movement of the armature is not confined to a plane perpendicular to the support means, as in subclass 276, below.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 68+, for rotary electric motor actuated switches.
- 100, for alternating current switch with rotating induction or eddy current member.
- 125, for multiple contact switches with rotary armature.
- 225, for electromagnets with relatively movable conductors including a rotating disk type armature member.

SEE OR SEARCH CLASS:

- 310, Electrical Generator or Motor Structure, appropriate subclasses for rotary electric dynamoelectric machine structure, especially subclasses 261+ for rotor structures.

273 This subclass is indented under subclass 270. Subject matter including means to adjust the position of the armature relative to the core or armature stop means.

- (1) Note. The distance between the armature and the core element may be adjusted by changing the position of the armature or by changing the position of the core element.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 96, for periodic switch with adjustable armature.
- 144, for switch with electrothermal actuator with armature positioning or adjusting means.
- 258, for plunger type armature with stroke adjustment means.
- 274, for armature biasing or bias adjustment means.

274 This subclass is indented under subclass 270. Subject matter including significant details of the armature biasing means or including significant means for adjusting the armature biasing means.

- (1) Note. Bias as used in this class refers to unidirectional force applied by a spring, a permanent magnet or an electromagnet acting on an armature, which tends to hold the armature in a given position.
- (2) Note. This subclass includes magnetically biased armatures, wherein a permanent magnet or an electromagnet is used to apply biasing force to the armature.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 15+, for automatic circuit interrupting devices with contact biasing.
- 192, for switches with contact biasing means.
- 253+, for electromagnets with armature latch means.
- 269, for electromagnets biased to be dynamically balanced.

SEE OR SEARCH CLASS:

- 307, Electrical Transmission or Interconnection Systems, subclass 142 for switching systems with switch locking, holding or braking means.
- 361, Electricity: Electrical Systems and Devices, subclass 194 for control circuits for electromagnetic devices including a holding means.

275 This subclass is indented under subclass 270. Subject matter wherein the armature is attached to its support means by a hinge type mounting arrangement.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

276, for pivot support type armature mounting means.

276 This subclass is indented under subclass 270. Subject matter wherein the armature is mounted upon a support such that it has a pivotal movement toward or away from the magnetic core or stop means when energized.

(1) Note. Pivotal movement as used here refers to armatures, usually elongated members supported at a point intermediate its ends to provide an up and down or back and forth movement of the armature, such as seesaw fashion; or the elongated armature member is supported at one end such as with a pivotal pin and the movement of the armature is perpendicular to the axis of the pivot means.

(2) Note. This subclass provides for elongated center pivot type armature.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

128+, multiple contact switches with pivotal armature.

181, for switches with plural magnets with pivoted armature.

272, for electromagnets with rotating disk or cylindrical armature.

275, for hinge type armature support.

277 This subclass is indented under subclass 220. Subject matter including means to prevent vibration or shock in the electromagnet.

(1) Note. This subclass includes means for mounting the electromagnet or the electromagnet casing with resilient or cushion means to prevent vibration from reaching the electromagnet.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

157+, for switches with operation inhibiting means (shock resistant).

271, for electromagnet armature bounce or vibration preventing means.

278, for electromagnet casing or enclosure.

SEE OR SEARCH CLASS:

248, Supports, subclasses 560+ for resilient supports.

336, Inductor Devices, subclass 100 for inductor devices (such as transformers and inductive reactors) with vibration control means.

278 This subclass is indented under subclass 220. Subject matter including structure of a casing or enclosure for the electromagnet.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

151+, for vacuum or hermetically sealed switches.

162, for plural switches with unitary housing, support or flux path.

202, for switches with significant housing or support means.

260, for plunger type electromagnets with sealed enclosure or casing.

292, for hermetically sealed or moisture proofed lifting or attracting electromagnet.

294, for lifting or attracting electromagnet with outer casing or housing.

299, for particular magnetic coil structure with casing.

SEE OR SEARCH CLASS:

174, Electricity: Conductors and Insulators, subclasses 17+ for boxes and housings with fluid or vacuum and subclasses 50+ for housings in general for electrical apparatus.

336, Inductor Devices, subclass 90 for inductors with outer casing or housing.

279 This subclass is indented under subclass 220. Subject matter including significant details of the armature shape, structure or material.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 55+, for conductive liquid type switches with significant armature structure.
- 80+, for polarity responsive switches with armature structure.
- 95+, for periodic switch armature structure.
- 124, for multiple contact switches with significant armature structure.
- 203, for switches with significant armature structure.
- 249, for armature structure to prevent chatter or noise.
- 261+, for electromagnets with plunger type armature structure.

280 This subclass is indented under subclass 279. Subject matter wherein the significant armature structure comprises spherical balls or elements, metallic filings or fine granular material.

281 This subclass is indented under subclass 220. Subject matter including significant magnetic core or pole shape, structure or material.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 84+, for magnetic structure in polarity responsive switches.
- 91, for actuating magnet structure or material in periodic switches.
- 153, for permanent magnet structure in vacuum or hermetically sealed switches.
- 296+, for magnet structure or material.
- 297+, for core structure.

SEE OR SEARCH CLASS:

- 336, Inductor Devices, appropriate subclasses, especially subclass 83 for structure of core forms or casing for various inductor devices; subclass 212 for structure and assembly of plural cores for inductor devices, and subclasses 233+ for core structure and composition in general.

282 This subclass is indented under subclass 220. Subject matter including significant details relating to the shape or structure of the coil or to the material of the coil.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 213+, for the structure of electron or ion beam deflecting magnets.
- 250, for alternating current switch with particular coil structure.
- 255+, for electromagnets with plunger type armature with particular coil structure or material.
- 299+, for coil structure or material in general.

SEE OR SEARCH CLASS:

- 336, Inductor Devices, appropriate subclasses for inductor device coil structure.

283 This subclass is indented under subclass 209. Subject matter including magnetic means for maintaining a blade such as a knife or razor blade in a sharp, burr free condition.

- (1) Note. Generally the cutting edge of the blade is held flat against the face of a magnet or in the field of the magnet for the purpose of straightening out the microscopic burrs on the cutting edge of the blade.

SEE OR SEARCH CLASS:

- 30, Cutlery, subclasses 35+ for razors having means to facilitate the sharpening of their blades (Note especially subclass 36) and subclasses 138+ for other cutting tools combined with a sharpening means.
- 76, Metal Tools and Implements, Making, subclasses 81 through 89.2 for tool sharpeners.
- 132, Toilet, subclass 292 for toilet kits having as part thereof magnet sharpening means.
- 279, Chucks or Sockets, appropriate subclasses for blade and tool handles having magnetic holding means.
- 451, Abrading, subclass 45 for a process of sharpening a cutting blade by abrading means.

284 This subclass is indented under subclass 209. Subject matter including means for magnetizing or demagnetizing magnets or electromagnets.

SEE OR SEARCH CLASS:

- 29, Metal Working, subclasses 607+ for methods of making permanent magnets not elsewhere classified.
- 307, Electrical Transmission or Interconnection Systems, subclass 101 for control or removal of residual or permanent magnetism.
- 324, Electricity: Measuring and Testing, subclass 200 for magnetic testing and measuring.
- 361, Electricity: Electrical Systems and Devices, subclasses 143+ for control circuits for electromagnetic devices including magnetizing or demagnetizing the magnetic field, and subclass 267 for demagnetizing systems and processes.

285 This subclass is indented under subclass 209. Subject matter including magnetic means for holding a device, which is separate from the magnetic means, in a desired position.

- (1) Note. This subclass includes holding type magnets with means to remove the object from the magnet, such as a lever element to lift the object away from the holding magnet.

SEE OR SEARCH CLASS:

- 134, Cleaning and Liquid Contact With Solids, appropriate subclasses, especially subclass 57 and 58 for cleaning devices that utilize magnets and electromagnets.
- 248, Supports, subclass 206 for specially mounted brackets utilizing magnets.
- 269, Work Holders, appropriate subclasses, particularly subclass 8 for magnetic work holders. Class 269 is the residual locus for patents to a device for clamping, support and/or holding an article in position to be operated on or treated.
- 279, Chucks or Sockets, appropriate subclasses for chucks or sockets actuated by electromagnetic means.
- 294, Handling: Hand and Hoist-Line Implements, subclass 65.5 and 88 for magnetic material handling devices.

- 439, Electrical Connectors, subclass 12 for electrical connectors with magnet or suction cup.
- 451, Abrading, subclasses 246+ for a magnetic rotary work holding device.

286 This subclass is indented under subclass 285. Subject matter including means adapted to be placed between the magnet and the workpiece or the object being held by the magnet.

- (1) Note. The adaptor may be made of a nonmagnetic material and be used merely to prevent, for example, the workpiece from rocking, or it may be of magnetic material and be used to bridge the flux from the magnet into the workpiece.
- (2) Note. This subclass also includes magnetic chucks that are angular in shape to facilitate holding the workpiece.

287 This subclass is indented under subclass 286. Subject matter wherein the holding magnet chuck is adjustable to various angles so that the workpiece can be held at various elevations.

- (1) Note. This subclass includes adjustable magnetic chucks that are angular in shape to facilitate holding the workpiece in various angular positions.

288 This subclass is indented under subclass 285. Subject matter wherein the holding magnet is a magnetic chuck or work-holding type which can be rotated while holding the workpiece.

- (1) Note. The rotary type magnetic chuck may include permanent magnets or electromagnets.

SEE OR SEARCH CLASS:

- 361, Electricity: Electrical Systems and Devices, subclasses 139+ for electric circuit for rotary type electromagnetic chucks.

289 This subclass is indented under subclass 285. Subject matter wherein the holding magnet is an electromagnet.

- (1) Note. This subclass includes electromagnetic chuck type magnets for hold-

ing workpiece in a desired position while performing a work operation upon the workpiece such as, for example, grinding or cutting.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 286, for holding magnet with workpiece to magnet adapter using electromagnets.
- 288, for rotary type holding magnet using electromagnets.

290 This subclass is indented under subclass 289. Subject matter wherein the electromagnet type work holder includes means to control the magnetic flux of the electromagnet such as, for example, shunt means or circuit controlling switch means.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 237, for magneto-mechanical motive device type electromagnet with adjustable shunt path.
- 295, for permanent magnet type work holding device with magnetic hold control means.

SEE OR SEARCH CLASS:

- 361, Electricity: Electrical Systems and Devices, subclasses 139+ for control circuits for an electromagnetic chuck.

291 This subclass is indented under subclass 289. Subject matter including electromagnets which are utilized for lifting articles such as pig-iron or for pulling articles such as hair pins from the hair.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 290, for lifting type electromagnets with control means.

SEE OR SEARCH CLASS:

- 175, Boring or Penetrating the Earth, subclass 328 for drilling bit or bit element which is magnetized or with magnet element.
- 209, Classifying, Separating, and Assorting Solids, subclasses 38 through 40 and 212 through 232 for magnetic assorting of solid materials.

- 414, Material or Article Handling, subclass 606 for an elevator or hoist and loading or unloading means therefor and wherein a magnet (e.g., an electromagnet) lifts an object of magnetically-attractive material for seizure by a grapple; and subclass 737 for a vertically swinging load support provided with a load-grasping member which may be in the nature of a magnet (e.g., an electromagnet).

- 600, Surgery, subclasses 9+ for magnetic energy applied to the body for therapeutic purposes, especially subclass 11 for probes for removing magnetic particles from the body.

292 This subclass is indented under subclass 291. Subject matter wherein the lifting or pulling type electromagnet is hermetically sealed to keep moisture, dust or other foreign particles from the magnet elements.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 151+, for vacuum or hermetically sealed type switches.
- 162, for plural switches with unitary housing.
- 202, for switches with housing or support means.
- 260, for hermetically sealed electromagnet with plunger type armature.
- 278, for electromagnet with sealed casing or enclosure.
- 294, for lifting or holding electromagnet with outer casing or housing.

SEE OR SEARCH CLASS:

- 174, Electricity: Conductors and Insulators, subclasses 17+ for boxes and housings with fluid or vacuum and subclasses 50.5+ for hermetic sealed envelope type boxes and housings for electrical devices.
- 336, Inductor Devices, subclasses 90+, for inductor with outer casing or housing.

293 This subclass is indented under subclass 291. Subject matter wherein the lifting or pulling magnet is enclosed within a casing such that it can be held by hand when it is in use.

SEE OR SEARCH CLASS:

336, Inductor Devices, subclass 66 for inductor device supported by a handle.

294 This subclass is indented under subclass 291. Subject matter wherein the lifting or pulling electromagnet is enclosed in a special housing or casing.

- (1) Note. This subclass includes lifting type magnets enclosed in sweeper type housing for rolling along the floor to pick up hairpins or other metallic particles.

SEE OR SEARCH THIS CLASS, SUBCLASS:

151+, for vacuum or hermetically sealed switches.
 162, for plural independent switches with unitary housing, support or flux path.
 202, for switches with significant housing or support means.
 278, for casing or housing for electromagnet with armature.
 292, for hermetically sealed lifting type electromagnet.

SEE OR SEARCH CLASS:

174, Electricity: Conductors and Insulators, subclasses 17+ for boxes and housing with fluid or vacuum and subclasses 50+ for boxes and houses in general for electrical devices.
 336, Inductor Devices, subclasses 90+ for inductor with outer casing or housing.

295 This subclass is indented under subclass 285. Subject matter including means to control or vary the holding strength of the magnet.

- (1) Note. This subclass includes permanent magnets with means to divert or shunt the magnetic flux away from the workpiece being held, to thereby magnetically release the workpiece for removal.

SEE OR SEARCH THIS CLASS, SUBCLASS:

12, for automatic circuit interrupting switches with shunting contacts.
 211, for electron or ion beam deflecting magnets with magnet shunt.

236+, for electromagnets with shunt means.

SEE OR SEARCH CLASS:

310, Electrical Generator or Motor Structure, subclass 190 for dynamoelectric machine winding or core structure with magnetic shunt.
 336, Inductor Devices, subclass 133 and 160+ for inductive devices with adjustable magnetic shunts and inductive regulators with magnetic shunts, respectively.

296 This subclass is indented under subclass 209. Subject matter including magnets or electromagnets, per se, with significant details of magnet structure, shape or configuration, or with details of the type of material of the magnet.

SEE OR SEARCH CLASS:

29, Metal Working, subclasses 602.1+ for process of making electromagnets.
 75, Specialized Metallurgical Processes, Compositions for Use Therein, Consolidated Metal Powder Compositions, and Loose Metal Particulate Mixtures, subclasses 122.1+ for magnetic alloys, and subclasses 228+ for consolidated metal powder compositions which may be magnetic.
 148, Metal Treatment, subclasses 100+ for treatment of magnetic material.
 252, Compositions, subclasses 62.51+ for magnetic material compositions.
 336, Inductor Devices, subclass 218 for core structure with magnetic orientation of magnetic core material; and subclass 225 for coils of special configuration.
 428, Stock Material to Miscellaneous Articles, subclass 611 for metallic stock having its magnetic properties coordinated with its shape, and subclass 928 for a collection of magnetic metallic stock materials.

297 This subclass is indented under subclass 296. Subject matter including significant details of the magnetic core structure or material.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 84+, for magnetic structure of polarity responsive switches.
- 91+, for actuating magnet structure of periodic switches.
- 103, for alternating current switch with plural magnetic actuating structures.
- 177+, for switches utilizing plural magnets or flux sources.
- 211, for electron or ion beam deflecting magnets with magnetic shunt structure.
- 236+, for electromagnet with magnet shunt structure.
- 281, for electromagnet with armature having details of the core structure or material.

SEE OR SEARCH CLASS:

- 336, Inductor Devices, subclass 83 for structure of core forms or casing for various inductor devices, subclass 212 for structure and assembly of plural cores for inductor devices, and subclasses 233+ for core structure and composition in general.

298 This subclass is indented under subclass 297. Subject matter including means to adjust the position of the magnetic core element to vary the airgap spacing.

- (1) Note. This subclass also includes electromagnets with means for adjusting the position of the connecting back strap relative to the magnetic cores to vary the reluctance of the electromagnet.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 86, for polarity responsive switches with adjusting means.
- 212, for electron or ion beam deflecting magnets with adjustable magnetic element.
- 237, for electromagnet and armature with adjustable shunt path.
- 273, for electromagnets with means to adjust the position of the armature with respect to the core element.
- 287, for work holding magnet with angularly adjustable fixture.

- 295, for work holding magnet with magnetic hold control means.

SEE OR SEARCH CLASS:

- 336, Inductor Devices, appropriate subclasses for inductors with adjustable cores, especially subclasses 132+ for inductors with relatively movable core parts.

299 This subclass is indented under subclass 296. Subject matter including significant details of the magnetic coil structure or material.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 213+, for electron or ion beam deflecting type coil structures.
- 250, for alternating current electromagnet and armature with particular coil construction or mounting means.
- 282, for electromagnets with significant magnetic coil structure or material.

SEE OR SEARCH CLASS:

- 336, Inductor Devices, appropriate subclasses for coils of various structural shape or configuration or coils made of various types of materials.

300 This subclass is indented under subclass 299. Subject matter including, means to cool the coil of the electromagnet.

SEE OR SEARCH CLASS:

- 174, Electricity: Conductors and Insulators, subclass 15.1 for fluid or vacuum cooling means for electrical apparatus.
- 336, Inductor Devices, subclasses 55+ for inductor devices with temperature modifier means.

301 This subclass is indented under subclass 296. Subject matter including electric or magnetic shielding means in combination with the magnet structure for shielding at least part of the magnet from electric or magnetic fields, or for preventing the coil of the magnet from emanating undesired electric or magnetic fields.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 202, for electromagnetic switch with electric or magnetic shielding means.
- 214, for electron or ion beam deflecting type electromagnet with shielding means.

SEE OR SEARCH CLASS:

- 174, Electricity: Conductors and Insulators, subclasses 35+ for electric or magnetic shields or screens, per se, or general utility.
- 336, Inductor Devices, subclass 84 for inductor devices provided with electric or magnetic shield means.

- 302** This subclass is indented under subclass 296. Subject matter wherein the particular magnet structure relates to permanent magnets.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 153, for vacuum or hermetically sealed type switch with permanent magnet structure.
- 179, for switch with electromagnet and permanent magnet structure.
- 222, for relatively movable coil and permanent magnet structure.
- 229+, for magneto-mechanical motive device with permanent magnets.
- 283, for blade sharpening or conditioning type permanent magnets.
- 295, for work or object holding permanent magnet with magnet hold control means.

SEE OR SEARCH CLASS:

- 29, Metal Working, subclasses 607+, for processes of mechanical manufacture of permanent magnets.
- 33, Geometrical Instruments, subclasses 355+, for magnetic compasses.
- 75, Specialized Metallurgical Processes, Compositions for Use Therein, Consolidated Metal Powder Compositions, and Loose Metal Particulate Mixtures, appropriate subclasses for ferrous alloys useful in permanent magnets.

- 251, Valves and Valve Actuation, subclass 65 for permanent magnet valve actuator devices.
- 310, Electrical Generator or Motor Structures, especially subclasses 152+ for the structure of permanent magnets utilized in dynamoelectric machines and subclass 181 for field winding comprising electromagnet and permanent magnet structure.
- 324, Electricity: Measuring and Testing, subclass 48 for testing permanent magnets.
- 336, Inductor Devices, subclass 110 for inductor including permanent magnet structure.

- 303** This subclass is indented under subclass 302. Subject matter wherein the permanent magnetic material is enclosed or embedded within a flexible plastic, cloth or tape.

- (1) Note. This subclass includes permanent magnets wherein the magnetic particles are enclosed between layers of cloth, plastic or tape or is embedded within the cloth, plastic or tape.

SEE OR SEARCH CLASS:

- 16, Miscellaneous Hardware, subclasses 116+ for insulated handles with permanent magnets embedded or enclosed therein.
- 296, Land Vehicles: Bodies and Tops, subclasses 107.01+ for magnetic weather seal for convertible automobile tops.
- 360, Dynamic Magnetic Information Storage or Retrieval, subclasses 131+, for record carriers which may include magnetic particles coated on or embedded in a flexible plastic base.

- 304** This subclass is indented under subclass 302. Subject matter wherein permanent magnets are mounted or arranged to prevent or substantially reduce stray leakage flux across the airgap.

- 305** This subclass is indented under subclass 302. Subject matter wherein the permanent magnet is in the form of a plug adapted to be threaded or otherwise inserted into a liquid containing vessel, such as a crankcase, for collecting

metallic particles suspended in the liquid for removal from the crankcase or container.

SEE OR SEARCH CLASS:

209, Classifying, Separating, and Assorting Solids, subclass 212 and 213+ for magnetic classifying, separating or assorting means.

210, Liquid Purification or Separation, subclasses 222+ for magnetic purification or separation means.

600, Surgery, subclass 11 for magnetic probes used to remove magnetic particles from the body.

306 This subclass is indented under subclass 302. Subject matter including plural permanent magnets.

SEE OR SEARCH THIS CLASS, SUBCLASS:

207, for permanent magnet actuated switches with plural permanent magnets.

END